North Dakota State University

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About the Catalog

The University Catalog is the official undergraduate and graduate catalog that includes information about academic programs and student services offered by North Dakota State University. It contains general University policies, as well as undergraduate and graduate academic policies and degree requirements, and the official curriculum for the academic year of publication. The catalog is published in an online format with the option to download a PDF of individual pages or a PDF of the entire catalog.

The catalog is intended to complement other university information including specific materials supplied by The Office of Admission, the Graduate School, and individual academic colleges and units. The catalog sections include the following:

- The academic policies, programs of study, and course descriptions sections are relevant for all students. Information in the admission and the undergraduate sections applies to undergraduate and professional students at the university. Information for graduate students, including admission, is available in the graduate section.
- The sections for colleges and departments link the reader directly to the official university websites for each academic college and unit. This is the same for the student resource section. Linking to the official university websites ensures that information is consistently up-to-date.
- The academic policies and information contained within this catalog are effective for the academic year of the published catalog. The past catalog archive section links to several prior years of the University Catalog.
- The undergraduate curricula in this catalog are effective for students who declare a program of study during the publication year of this catalog. Undergraduate students are subject to meeting the major requirements for declared majors and minors outlined in the Baccalaureate Degree and Graduation Requirements (https://catalog.ndsu.edu/academic-policies/undergraduate-policies/degree-and-graduation/) section of the catalog. Graduate students should refer to information provided in the Graduate (https://catalog.ndsu.edu/graduate/) section of the catalog.
- Questions about undergraduate academic policies and curriculum guides may be directed to the Office of Registration and Records (https://www.ndsu.edu/registrar/). Questions about graduate programs and policies can be directed to the Graduate School (https://www.ndsu.edu/gradschool/).
- It is important for students to be familiar with the information that applies to them, including policies and procedures related to registration, academic progress and degree requirements. Students are strongly encouraged to consistently consult their academic advisers 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 NDSU Policy 335: Academic Responsibility and Conduct (https://www.ndsu.edu/fileadmin/policy/335.pdf) and NDSU Policy 601: Rights and Responsibilities of Community: A Code of Student Conduct (https://www.ndsu.edu/fileadmin/policy/601.pdf).
- Information about the Family Educational Rights and Privacy Act of 1974 (https://www.ndsu.edu/onestop/student-privacy-policy-ferpa/), as amended, is available online or in the Office of Registration and Records.

Reservation of Rights (Subject to Change Statement)

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 catalog. All such changes are effective at such times as the proper university authorities determine, and may apply not only to prospective students but also to those who are already enrolled in the university.

Non-discrimination Policy

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

NDSU Overview

To learn more about North Dakota State University, visit ***About*** on the NDSU website. There you will find information related to the student-focused, land-grant, research heritage of the university. Information includes:

- Research status
- Enrollment numbers
- NDSU faculty and staff
- Campus map
- NDSU facts
- Mission statement

- Recent news
- Explore the Fargo-Moorhead community

Administration

- Office of the President (https://www.ndsu.edu/president/)
- Office of the Provost (https://www.ndsu.edu/provost/)
- President's Cabinet (https://www.ndsu.edu/president/about/the_presidents_cabinet/)

Accreditation

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

Accrediting Agency Degrees and Programs

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

- Accreditation Commission for Programs in Hospitality Administration: Hospitality and Tourism Management (Bachelor of Arts and Bachelor of Science)
- Accreditation Council for Pharmacy Education (ACPE): Pharmacy Doctorate
- Accrediting Council for Education in Nutrition and Dietetics: Dietitian Education Program (Bachelor of Science); Didactic Program in Dietetics (Bachelor of Arts and Bachelor of Science)
- American Council for Construction Education: Construction Management
- American Society of Health-System Pharmacists: Pharmacy (Doctor of Pharmacy)
- American Veterinary Medical Association Committee on Veterinary Technician Education and Activities (AVMA): Veterinary Technology (Bachelor of Science)
- Association to Advance Collegiate Schools of Business: Business (Bachelor Science and Master of Business Administration)
- Certified Financial Planner Board of Standards: Family Financial Planning (Master of Science and Graduate Certificate)
- Commission on Accreditation for Respiratory Care: Respiratory Care (Bachelor of Science)
- Commission on Accreditation of Allied Health Education Programs: Exercise Science (Bachelor or Arts and Bachelor of Science)
- Commission on Accreditation of Athletic Training Education (CAATE): Athletic Training (Master of Athletic Training)
- Commission on Collegiate Nursing Education (CCNE): Bachelor of Science in Nursing; Master of Science in Nursing; Doctor of Nursing Practice
- Council for Interior Design Accreditation: Interior Design (Bachelor of Arts and Bachelor of Science)
- Council on Education for Public Health (CEPH): Public Health (Master of Science)
- Engineering Accreditation Commission of ABET, http://www.abet.org: Bachelor of Science degrees in: Agricultural and Biosystems Engineering, Civil Engineering, Computer Engineering, Construction Engineering, Electrical Engineering, Industrial Engineering and Management, Manufacturing Engineering, Mechanical Engineering
- Institute of Food Technologists: Food Science (Bachelor of Science)
- Joint Review Committee for Education in Radiologic Technology: Radiologic Sciences (Bachelor of Science)
- Landscape Architecture Accreditation Board: Bachelor of Landscape Architecture
- National Accrediting Agency for Clinical Laboratory Science: Medical Laboratory Science (Bachelor of Science)
- 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)
- Council for the Accreditation of Educator Preparation: 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)

Agencies Associated with the University

- NDSU Extension (https://www.ndsu.edu/agriculture/extension/)
- NDSU Foundation (https://www.ndsufoundation.com/)
- Office of Teaching and Learning (https://www.ndsu.edu/otl/)
- North Dakota Forest Service (https://www.ag.ndsu.edu/ndfs/)
- Northern Crops Institute (http://www.northern-crops.com/)
- Research Technology Park (https://www.ndsuresearchpark.com/)
- State Seed Department (https://www.seed.nd.gov/)
- Tri-College University (https://www.tri-college.org/)
- Upper Great Plains Transportation Institute (http://www.ugpti.org/)
- North Dakota Agricultural Experiment Station (https://www.ag.ndsu.edu/research/)

State Board of Higher Education

Created by constitutional amendment in 1939, the State Board of Higher Education (https://ndus.edu/sbhe-overview/) is the governing body of North Dakota State University and all other state supported institutions of higher education in North Dakota. The board's chief executive officer is the Chancellor (https://ndus.edu/ndus-overview/ndus-chancellor/) of the North Dakota University System, with offices in the state capitol in Bismarck. More information regarding the State Board of Higher Education, including members, can be found on the North Dakota University System (https://ndus.edu/) website.

Colleges

College of Agriculture, Food Systems and Natural Resources (https://www.ndsu.edu/agriculture/academics/)

College of Arts and Sciences (https://www.ndsu.edu/artsandsciences/)

College of Business (https://www.ndsu.edu/business/)

College of Graduate and Interdisciplinary Studies (https://www.ndsu.edu/gradschool/)

College of Engineering (https://www.ndsu.edu/coe/)

College of Health and Human Sciences (https://www.ndsu.edu/healthhumansciences/)

Academic Departments

A

Accounting and Information Systems (https://www.ndsu.edu/business/)

Agribusiness and Applied Economics (https://www.ndsu.edu/business/)

Agricultural and Biosystems Engineering (https://www.ndsu.edu/aben/)

Agricultural and Family Education (https://www.ndsu.edu/agriculture/academics/academic-units/youth-development-family-and-agricultural-education/)

Allied Sciences (https://www.ndsu.edu/alliedsciences/)

Animal Sciences (https://www.ndsu.edu/agriculture/academics/academic-units/animal-sciences/)

B

Biological Sciences (https://www.ndsu.edu/biology/)

C

Challey School of Music (https://www.ndsu.edu/performingarts/music/)

Chemistry and Biochemistry (https://www.ndsu.edu/chemistry/)

Civil, Construction and Environmental Engineering (https://www.ndsu.edu/ccee/)

Coatings and Polymeric Materials (https://www.ndsu.edu/cpm/)

Communication (https://www.ndsu.edu/communication/)

Computer Science (https://www.ndsu.edu/cs/)

Criminal Justice (https://www.ndsu.edu/criminaljustice/)

D

School of Design, Architecture, and Art (https://www.ndsu.edu/sodaa/)

- Architecture and Interior Design (https://www.ndsu.edu/architecture/)
- Landscape Architecture, Disaster Resilience, and Emergency Management (https://www.ndsu.edu/landscapearchitecture/)
- Art and Design (https://www.ndsu.edu/visualarts/)

E

School of Education (https://www.ndsu.edu/education/)

Electrical and Computer Engineering (https://www.ndsu.edu/ece/)

English (https://www.ndsu.edu/english/)

H

Health, Nutrition, and Exercise Sciences (https://www.ndsu.edu/hnes/)

Human Development and Family Science (https://www.ndsu.edu/hdfs/)

School of Humanities (https://www.ndsu.edu/schoolofhumanities/)

I

Industrial and Manufacturing Engineering (https://www.ndsu.edu/ime/)

M

Management and Marketing (https://www.ndsu.edu/business/)

Mathematics (https://www.ndsu.edu/math/)

Mechanical Engineering (https://www.ndsu.edu/me/)

Microbiological Sciences (https://www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences/)

N

School of Natural Resource Sciences (https://www.ndsu.edu/snrs/)

School of Nursing (https://www.ndsu.edu/nursing/)

P

School of Pharmacy (https://www.ndsu.edu/pharmacy/)

- Pharmaceutical Sciences
- Pharmacy Practice

Physics (https://www.ndsu.edu/physics/)

Plant Pathology (https://www.ndsu.edu/agriculture/academics/academic-units/plant-pathology/)

Plant Sciences (https://www.ndsu.edu/agriculture/academics/academic-units/plant-sciences/)

Political Science & Public Policy (https://www.ndsu.edu/politicalscience/)

Psychology (https://www.ndsu.edu/psychology/)

Public Health (https://www.ndsu.edu/publichealth/)

S

Sociology and Anthropology (https://www.ndsu.edu/socanth/about/)

Statistics (https://www.ndsu.edu/statistics/)

T

Theatre Arts (https://www.ndsu.edu/performingarts/theatre/)

Transportation, Logistics and Finance (https://www.ndsu.edu/business/)

Admission

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

Domestic Undergraduate Admission

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

International Undergraduate Admission

The Office of International Student & Study Abroad Services processes international undergraduate applications. Visit the **International Undergraduate Admission** website for undergraduate international student application requirements and to find out how to apply.

Graduate Admission

Admission to the Graduate School is a selective process intended to identify applicants who are outstanding among recipients of baccalaureate degrees. For graduate admission information, please visit the Graduate Admission catalog page (https://catalog.ndsu.edu/graduate/admission-information/) or the Graduate School website (https://www.ndsu.edu/gradschool/).

Readmission

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

Domestic First-Year Admission

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

International First-Year Admission

For information regarding applications for international first-year applicants, please see the International Admission (https://catalog.ndsu.edu/admission/#internationaladmissiontext) catalog page.

Early Entry Admission

The Early Entry Program allows high school students to take courses at NDSU while still enrolled in high school. Students who are in their junior and senior year of high school and who have earned a cumulative GPA of 3.0 or higher are ideal candidates for the program. Early Entry students pay a reduced tuition and fees rate.

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

The Early Entry Program is different from early admission status. Early admission is primarily used for high-school students as conditional acceptance into a specific degree program. Early entry is also different from dual credit (https://www.ndsu.edu/dce/k12_students/early_entry/) in that you do not earn high school credit for these courses unless you seek permission from your high school or home school.

International Students Early Entry Admission

International student applicants attending high school in the United States who are interested in Early Entry admission should first begin by contacting the international undergraduate admission team in the Office of International Student & Study Abroad Services (https://www.ndsu.edu/international/about/contact/).

Domestic Transfer Admission

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

International Transfer Admission

For information regarding applications for international transfer applicants, please see the International Admission (https://catalog.ndsu.edu/admission/#internationaladmissiontext) catalog page.

International Student Admission

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

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

- Applicants should have an educational background in the core curriculum of laboratory science, mathematics, social science, and English. A secondary or high school grade point average of at least 2.75 (4.0 scale) or the equivalent in core subjects is recommended.

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

- A student is considered a transfer applicant if they have 24 or more transferable college credits completed at the time of application. A decision will be based on your college academic record including coursework attempted, coursework completed and cumulative GPA from all previously attended post-secondary institutions. A post-secondary/university grade point average (GPA) of 2.0 (4.0 scale) or the equivalent, is recommended.

Non-Degree Seeking Admission

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

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

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

International Non-Degree Seeking Admission

International undergraduate applicants seeking non-degree admission should visit the International Admission (https://www.ndsu.edu/international/apply/undergraduate/) website.

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

Selective and Limited Admission Programs

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

Undergraduate Reactivation/Readmission

Undergraduate or Doctor of Pharmacy students who discontinue enrollment, either voluntary or involuntary, for one or more semesters (except summer) must request to reactivate their record before being eligible to enroll in classes. To begin this process, students complete and submit the Undergraduate Reactivation/Petition for Readmission (https://www.ndsu.edu/onestop/undergraduate-reactivationpetition-readmission/) form. It is recommended that all students begin this process early as deadlines will apply.

During a discontinued enrollment period from NDSU, students who attended one or more institutions must identify those institutions on the *Reactivation/Petition* form and arrange to have official transcripts submitted for review. NDSU is able to retrieve academic transcripts from other North Dakota University System (NDUS) institutions at no charge to students, but the institution must be identified on the form when submitted. Students must arrange for other transcripts from outside of the NDUS system to be sent to the address listed in the *Previous Enrollment* section of

the form. Students should be aware that a reactivation decision could be placed on hold or rescinded if official transcripts are not received. Students seeking reactivation/readmission must achieve a minimum cumulative GPA of 2.00 at these other institutions. If the minimum cumulative GPA of 2.00 was not achieved, students are also considered for reactivation/readmission if their minimum cumulative GPA of 2.00 is met by combining the GPA from all institutions attended.

Deadlines and Academic Standing Considerations

Students who discontinued enrollment from NDSU in good academic standing

Students who left NDSU in good academic standing (NDSU cumulative GPA is 2.00 or higher) must submit the form no later than 5:00 PM on Friday of the first week of classes for the term the student is seeking to be re-enrolled. *Reactivation* forms will not be processed after this deadline and students will have to submit a new reactivation form for a future semester. Students should be aware that a reactivation decision could be rescinded if official transcripts are not received before the start of the next semester or it is found the students' cumulative GPA at other institutions or all institutions does not meet the 2.00 minimum.

Students who discontinued enrollment from NDSU with an academic alert or Continued alert

Students who left the university with one of these academic deficiencies in their last semester at NDSU is considered to be eligible to enroll in classes. However, students who attended one or more institutions after leaving NDSU will be required to submit official transcripts *before* a reactivation decision can be granted. It is highly recommended a student submit the *Reactivation* form early and arrange to have transcripts send if this applies. Students need to be aware that a reactivation decision cannot be considered if these transcripts are not received or the cumulative GPA from these other institutions is not 2.00. For students who did not attend elsewhere, the latest a form may be received is no later than 5:00 PM on Friday of the first week of classes for the term the student would like to enroll. *Reactivation* forms will not be processed after this time/day and to be readmitted in a future semester, students will have to submit a new reactivation form for a future semester. **(Prior to fall 2022 these standings were warning, probation and continued probation.)**

Students who discontinued enrollment from NDSU as a result of an academic suspension (Petition for Readmission)

Students who served the university's imposed academic suspension for a minimum of two semesters must ***Petition for Readmission*** by the deadlines indicated below. It should be noted that readmission is not guaranteed but is influenced by the document the student must upload in the section titled *Returning from an NDSU Academic Suspension*. This document and the student's previous academic performance are assessed by a readmission committee.

As a result of this process, an earlier deadline is necessary to ensure that the committee has had adequate time to review the readmission material fully. Should the decision to readmit be granted, students require adequate time to find and use university resources, which may include meeting and discussing an educational plan for enrollment with an academic advisor. Forms submitted after the deadline will be considered for a future semester. The 2.00 minimum cumulative GPA standards described above will be applied to students who attended other institutions during the suspension period. The deadlines for the ***Petition for Readmission*** process are:

- Readmission consideration in a Spring semester = November 20 (until midnight)
- Readmission consideration in a Fall semester = July 20 (until midnight)
- Summer semester readmission is not supported. Students returning from an academic suspension are strongly discouraged from taking summer classes due to the expedited timeline of classes. Students are shown to be more successful returning in either a fall or spring semester.

Graduate Admission Policies

Admission Requirements

Admission to the College of Graduate and Interdisciplinary Studies (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.
   a. Applicants still completing a baccalaureate degree may apply.
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.

Each program may set higher qualifications and may require the submission of additional evidence of academic performance.

Application Requirements

All degree and certificate seeking applicants must submit the following to complete the application process. Additional application requirements are found on the Graduate College website: https://www.ndsu.edu/gradschool/apply (https://www.ndsu.edu/gradschool/apply/).

- Online Application for Graduate Admission
  - Current graduate students adding a graduate certificate must submit the Request to Add a Certificate to a Graduate Degree (https://powerforms.docusign.net/f3f9def4-ea91-4164-9e08-2e549196549f/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) form and $35 application fee to apply.
- $35 application fee
- Official transcripts
  - Non-degree applicants are not required to submit transcripts.
  - 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.

Applying to Multiple Programs

To apply for additional programs, a separate application and $35 fee are required for each. Other previously submitted documents may be used for additional applications, please email ndsu.grad.school@ndsu.edu (ndsu.grad.school@ndsu.edu?subject=Use%20application%20material%20from%20previous%20application) to notify our admissions team.

English Language Proficiency

All graduate applicants, regardless of citizenship or residency, must demonstrate proficiency with the English language before they will be considered for admission to a graduate program.

This requirement may be met by applicants who have:

- Been raised in a recognized country where English is the only official language. A list of exempt counties (https://www.ndsu.edu/gradschool/apply/international/#:~:text=Countries%20Exempt%20from%20the%20English%20Proficiency%20Examination%20Requirement) is found on the Graduate College website.
- Earned a bachelor's degree or higher from a recognized institution in a recognized country where English is the only official language.
- Achieved a satisfactory TOEFL (Test of English as a Foreign Language), IELTS (International English Language Testing System), or Duolingo score. The test date must be within two years of the date of the application to the Graduate College. Minimum scores required:
  - Test of English as a Foreign Language (TOEFL (https://www.ets.org/toefl/)): 71 (internet-based)
  - Duolingo (https://englishtest.duolingo.com/): 105 (internet-based)
  - International English Language Testing System (IELTS (https://www.ielts.org/)): 6.0 (academic version)

Please note that applicants meeting the criteria above may need to contact the Graduate College to ensure their exemption from the test of English proficiency requirement.

Admission Status

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; however, they show potential for successful graduate study. Upon admission in conditional standing, the student's program must specify conditions to be satisfied for a change in status to full graduate standing.

Admitted students with an undergraduate cumulative grade point average (CGPA) below 3.0 at the time of admission will be placed in conditional standing by the Graduate College. The condition placed by the Graduate College requires the student to earn a CGPA of 3.0 or higher in their first nine graduate didactic credits; additional conditions may be placed by the student's academic program.

Students admitted under conditional status are automatically placed on academic warning until the conditions of admission are met (see Academic Standing (https://catalog.ndsu.edu/graduate/graduate-school-policies/#academicstandardstext)).

Students admitted conditionally to a graduate program cannot earn more than 12 graduate credits prior to completing the conditions of admission. However, an exception to this policy enables programs to allow students admitted to an accelerated degree program to earn up to one-half of their required program's graduate credits while in conditional standing. Graduate credits earned beyond 15 while conditionally admitted may not be eligible for undergraduate financial aid and would be charged at the graduate tuition rate.

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. Some courses may have prerequisites or other requirements, which may require consultation and permission to enroll from course instructors. In courses with limited enrollment, preference is 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. Professional development graduate courses (numbered 600 or 2000), offered by NDSU Distance and Continuing Education (https://www.ndsu.edu/dce/), are not eligible to use toward a graduate degree.

Non-degree students who wish to become degree-seeking students must complete the admission process through the Graduate College (including a new application and fee). No more than 10 credits earned as a non-degree student may be used toward a graduate degree, and must be approved by the student's adviser, supervisory committee (if applicable) and the graduate program coordinator.

Student Financial Information

Comprehensive student financial information can be found on the One Stop (https://www.ndsu.edu/onestop/) website. Students and families can use this website for information related to students accounts, including tuition and fees, payment information, financial aid and scholarship opportunities, and policies and procedures related to residency and tuition reciprocity programs. In addition, NDSU is committed to providing resources to veteran and military students and dependents that will help guide them in receiving educational benefits.

- Financial Aid and Scholarships (https://www.ndsu.edu/onestop/financial-aid-and-scholarships/)
- Residency and Tuition Reciprocity (https://www.ndsu.edu/onestop/residency-and-reciprocity/)
- Tuition and Billing (https://www.ndsu.edu/onestop/tuition-and-billing/)
- Military and Veteran's Education Benefits and Certification (https://www.ndsu.edu/veterans/)

Academic Policies

Academic policies, procedures, rules, guidelines and regulations are all part of academic compliance and are adopted to insure that programs at North Dakota State University are consistently of high quality. It is the responsibility of NDSU students and employees to comply with the standards set-forth within this publication and any regulation published on the NDSU website. These policies, procedures, rules, guidelines, and regulations maintain NDSU's academic compliance with federal and state regulations and meet quality standards set forth by the Higher Learning Commission (HLC) (https://www.hlcommission.org/).

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Academic Advising and the Career and Advising Center

Academic Advising

North Dakota State University is committed to an advising experience to assist students in reaching their full potential. The successful development of our students will be an intentional outcome of a partnership between advisor and advisee that provides accurate, supportive and quality information.

We envision an advising process that is:

- Consistent and student centered from matriculation through graduation
- Holistic, exploring academic, career, and life decisions
- Integrated and designed to encourage advising relationships and services across all units of the university#(Academic, Career, and Well-being)
- Developmental
- Continually evaluated and responsive to data
- Committed to accessible, inclusive, and equitable practices

We envision advisors who are:

- Knowledgeable
- Accessible and approachable
- Caring and responsive

We envision advisees who are:

- Engaged in the advising relationship
- Responsible and prepared for advising discussions
- Aware of resources regarding campus policies and procedures

Following admission to NDSU, each student is assigned an advisor from the college or department in which the student is majoring. If a major has not been declared, an assignment is made with an advisor in the Career and Advising Center (https://career-advising.ndsu.edu/). Advisors assist students in selecting courses to ensure a balanced education and they help interpret university and college policies and requirements. However, students are responsible for their academic decisions and meeting all program requirements including the selection of courses, meeting course requisites (co-requisites/prerequisites), and adhering to policies, procedures, and deadlines. Students are encouraged to see their advisor prior to registration and to consult the university Bulletin for all degree program requirements. Students with advisor holds are required to meet with their advisors before the hold is lifted. advisor assignments and holds can be viewed on Campus Connection.

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

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

Career and Advising Center

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

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

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

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

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

Location & Contact Information:

306 Ceres Hall

701-231-7111

ndsu.cac@ndsu.edu

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

Academic Calendar & Final Exams

Calendar Year

NDSU operates on a semester system consisting of two standard 16-week fall and spring semesters, plus a final examination week. A 12-week summer semester is also offered. In all semesters, variable-length, short-session courses are available, and meet the same total contact (class) hours as in a standard semester. See definition of an academic credit (p. 31).

Mid-Term

The mid-term point of a standard semester is approximately 40 class days after the standard semester start. See mid-term grading (p. 37).

Summer Semester

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

Final Examinations

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

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

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

Dead Week

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

Academic Credit

NDSU Credit Hour Definition

NDSU defines and assigns credit hours in accordance with the requirements articulated by the United States Department of Education, the Higher Learning Commission, and the North Dakota State Board of Higher Education.

Specifically, NDSU defines a “credit hour” as an amount of student work represented in intended learning outcomes and verified by evidence of student achievement that reasonably approximates:

1. Not less than 50 minutes of classroom or direct faculty instruction and a minimum of two hours out-of-class student work each week for approximately fifteen weeks for one semester, or the equivalent amount of work over a different period of time; or
2. At least an equivalent amount of work as outlined in item 1 above for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

A clock hour at NDSU is normally represented as 50 minutes of lecture or structured student/faculty interaction or 2-3 hours of laboratory session each week of the semester or at least the equivalent of work.

The University adopts the federal and state definitions of the credit hour, regardless of the mode of delivery, including but not limited to: self-paced, synchronous online, asynchronous online, hybrid, lecture, seminar, and laboratory.

Academic Honesty and Integrity

NDSU strives to create an atmosphere of honesty, trust, and integrity amongst its students, faculty, staff. Faculty members are responsible for providing guidelines concerning academic honesty and expectations at the beginning of the semester for each course.

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

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

Faculty members will report the incident via the ***Student Academic Misconduct Report*** form linked from the Academic Honesty and Integrity website. 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.

Refer to the Academic Honesty and Integrity (https://www.ndsu.edu/academichonesty/) website for more information regarding NDSU's academic honesty and integrity, student expectations, disciplinary sanctions, appeal procedures, and hearing guidelines.

Class Attendance

At NDSU class attendance refer to NDSU Policy Manual, Policy 333 (https://www.ndsu.edu/fileadmin/policy/333.pdf) for specific student and instructor responsibilities, including absence information. Class attendance policies may not have discriminatory effect (intentional or unintentional) on members of a protected class (see NDSU Policy 100 (https://www.ndsu.edu/fileadmin/policy/100.pdf)).

NOTE: Missing class due to common illnesses is inevitable at some point. The past few years have certainly shown the importance of staying home when symptomatic, as to limit exposure to others. Student Health Service (SHS) routinely receives requests for class absence excuses, which they can provide, however, the illnesses students are typically presenting with are generally best cared for by rest and self-care at home. Requiring documentation for things such as sore throats, cold symptoms, or mild gastrointestinal illnesses is not only inconvenient for students, but will likely also incur an unnecessary cost.

Co-Curricular Activities

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

Commencement

Commencement exercises are held at the close of fall and spring semesters for students earning bachelor, master and/or doctoral degrees.

Students who complete graduation requirements during the summer are eligible to participate in the May commencement ceremony 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 student participation in the commencement ceremony must be made by the date specified by the Office of Registration and Records. Orders for caps, gowns, and hoods are made by the date specified by the NDSU Bookstore (http://www.ndsubookstore.com/). Commencement information is available at www.ndsu.edu/commencement (https://www.ndsu.edu/commencement/).

Degrees Offered and Accelerated Degree Programs

A degree is the title of the credential that the university confers on a graduate who has completed all university requirements. Degrees are defined by the State Board of Higher Education of the North Dakota University System Policy 409: Degrees Offered (https://ndusbpos.sharepoint.com/:w:/s/NDUSPoliciesandProcedures/EUI_EJRtUx1HoaFZyCfqD2MBrVyhonpUFz0OnGPLZ1RU7A/?e=9ANFbL).

Degree Types Defined

Certificate of Completion - A certificate awarded for the completion of an undergraduate course of study of less than nine credit hours or a graduate course of study of less than eight credit hours.

Program Certificate - A program certificate is a course of study requiring a minimum of nine credit hours at the undergraduate level or eight credit hours at the graduate level. A certificate program can be completed in one year of study or less.

Bachelor's Degree - A bachelor's degree requires a minimum of 120 semester credits. A baccalaureate degree is comprised of academic courses in general education and a major field of study consisting of a minimum of 32 credits related to an academic area. Majors may include subplans (also called options, specializations, concentrations, emphasis areas, etc.) which are a specific identified group of courses consisting of a minimum of 12 credits. Subplans may not always appear on the transcript; this is determined by the department at the time of the subplan request. In addition to a major, students may also wish to pursue a minor program of study as part of their bachelor's degree (see Other Credential Offered below).

Master's Degree - The Master of Arts and Master of Science degrees require a minimum of 30 credit hours in courses that carry graduate credit.

Education Specialist - This degree requires a minimum of 60 credit hours in courses that carry graduate credit beyond the baccalaureate degree. This degree is a professional degree for certification in an educational field.

Doctoral Degree - A Doctor of Philosophy degree requires a minimum of 90 credit hours beyond the bachelor's degree in courses that carry graduate credit with a substantial component of independent research. A Doctor of Education degree also requires a minimum of 90 credit hours beyond the bachelor's degree and it recognizes the completion of academic preparation for professional practice in education. A Doctor of Musical Arts requires

a minimum of 90 credits beyond the baccalaureate degree. A Doctor of Pharmacy degree is a terminal degree program that prepared individuals to practice pharmacy. A Doctor of Nursing Practice requires 86 credit hours beyond the bachelor's degree and prepares nurses to make contributions to evidence-based practice through professional leadership and scholarly practice and to function as clinical educators of future nurses.

Other Credentials Offered

Minor - A minor is a similar grouping courses in a field of study with a minimum of 16 credit hours. Minors cannot be earned without the student also completing a major program of study. Only after a baccalaureate degree is earned at NDSU can a student return to pursue a minor on its own.

Undergraduate Degrees

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. 68) and/or requirements as specified by their academic college on the program curriculum guide.

NDSU confers the following degrees at the undergraduate level:

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

Graduate Degrees

NDSU awards the following graduate degrees:

- Doctor of Education (Ed.D.)
- Doctor of Musical Arts (D.M.A.)
- Doctor of Nursing Practice (D.N.P.)
- Doctor of Pharmacy (Pharm.D.)
- Doctor of Philosophy (Ph.D.)
- Education Specialist (Ed.S.)
- Master of Accountancy (M.Acc.)
- Master of Architecture (M.Arch.)
- Master of Arts (M.A.)
- Master of Athletic Training (M.A.Trg.)
- Master of Business Administration (M.B.A.)
- Master of Construction Management (M.Cons.M.)
- Master of Education (M.Ed.)
- Master of Engineering (M.Engr.)
- Master of Landscape Architecture (M.L.A.)
- Master of Music (M.M.)
- Master of Natural Resources Management (M.N.R.M.)
- Master of Public Health (M.P.H.)
- Master of Public Health in Epidemiology (M.P.H.Epi.)

- Master of Public Policy (M.P.P.)
- Master of Science (M.S.)
- Master of Software Engineering (M.S.E.)
- Master of Supply Chain Management (M.S.C.M.)

Accelerated Degree Programs

NDSU offers accelerated programs of study in a variety of academic disciplines. These programs provide an opportunity for highly-qualified students to earn both a bachelor's degree and master's degree in a cost-effective, high-quality and timely manner. The following disciplines are available as a combined accelerated program where requirements for each degree have been agreed upon by the faculty:

Undergraduate Program	Graduate Program
B.S. in Agribusiness	**M.S. in Agribusiness & Applied Economics**
B.S. in Agricultural Economics	**M.S. in Agribusiness & Applied Economics**
B.S.A.B.En. in Agricultural and Biosystems Engineering	**M.S. in Agricultural and Biosystems Engineering**
B.S. in Animal Science	**M.P.H. in Public Health**
B.S. in Biochemistry & Molecular Biology	**M.S. in Biochemistry**
B.S. or B.A. in Biological Sciences	**M.S. in Biology**
B.S. in Biotechnology	**M.S. in Microbiology**
B.S. in Chemistry	**M.S. in Chemistry**
B.S.C.E. in Civil Engineering	**M.S.CVE. in Civil Engineering**
Minor in Coatings & Polymeric Materials*	**M.S. in Coatings & Polymeric Materials**
B.S.Con.E. in Construction Engineering	**M.S. or M.Cons.M. in Construction Management**
B.S.Con.E. in Construction Engineering	**M.S.CVE. in Civil Engineering**
B.S.Cons.M. in Construction Management	**Master of Business Administration**
B.S.Cons.M. in Construction Management	**M.S. or M.Cons.M. in Construction Management**
B.S.Cpr.E. in Computer Engineering	**M.S. or M.Engr. in Electrical & Computer Engineering**
B.S. in Computer Science	**M.S. in Computer Science**
B.S. or B.A. in Criminal Justice	**M.S. in Criminal Justice**
B.S. in Crop and Weed Science	**M.S. in Plant Sciences**
B.S. or B.A. in Economics	**M.S. in Agribusiness & Applied Economics**
B.S.E.E. in Electrical Engineering	**M.S. or M. Engr. in Electrical & Computer Engineering**
B.S. in Emergency Management	**M.P.H. in Public Health**
B.S. in Exercise Science	**M.A.Trg. in Athletic Training**
B.S. in Food Science	**M.S. in Cereal Science**
B.S. in Health Services	**M.P.H. in Public Health**
B.S. in Horticulture & Urban Agriculture	**M.S. in Horticulture & Urban Agriculture**
B.S. in Human Development & Family Science	**M.S. in Human Development & Family Science**
B.S.I.E.Mgt. in Industrial Engineering and Management	**Master of Business Administration**
B.S. in Mathematics	**M.S. in Mathematics**
B.S.M.E. in Mechanical Engineering	**M.S. in Mechanical Engineering**
B.S. in Microbiology	**M.S. in Microbiology**
B.S. in Microbiology	**M.P.H. in Public Health**
B.S. in Natural Resources Management	**M.N.R.M in Natural Resources Mgt. (not eligible with the M.S. in NRM)**
B.S. in Nutrition Science	**M.S. in Dietetics**
B.S. in Nutrition Science	**M.P.H. in Public Health**
B.S. in Nutrition Science	**M.S. in Health, Nutrition and Exercise Science - Exercise Science & Nutrition option**
B.S. or B.A. in Physics	**M.S. in Physics**
B.S. or B.A. in Political Science	**M.P.P. in Public Policy**
B.S. in Psychology	**M.P.H. in Public Health**
B.S. in Sport Management	**M.S. in Sport Management**

Guidelines for Accelerated Bachelors to Masters Programs

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

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

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

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

Degree Posting and Diploma Information

Degree Posting

Undergraduate students must declare their intent to graduate with the Office of Registration and Records. Graduate students must also declare their graduation intent with the Graduate School. Degrees are posted to academic records three times per academic year - at the close of each semester. Conferral date of the degree is the last day of finals week, which is the last instructional day of the term. It takes approximately three weeks for the degree to be posted to the academic record at the close of the semester in which degree requirements were reviewed to be successfully completed.

Diplomas

Diplomas are mailed approximately five weeks following the close of the academic semester in which graduation requirements have been completed. Diplomas will not be released for students who have outstanding debts owed to the university or who have select other holds. Students are responsible for submitting name and address updates for diploma processing. Should a diploma be returned for an insufficient address, the Office of Registration and Records makes every attempt to obtain an updated address. When an updated address is not available, it is held in the Office of Registration and Records for one year, after which time a student will need to request a diploma replacement.

A diploma replacement (https://www.ndsu.edu/onestop/diploma-replacement-requests/) service is provided by the Office of Registration and Records for those who have lost or damaged their original diploma.

FERPA

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

1. The right to inspect and review the student's education records within 45 days of the day the University receives a request for access.
2. The right to request the amendment of the student's education records that the student believes are inaccurate, misleading, or otherwise in violation of the student's privacy rights.

3. The right to consent to disclosures of personally identifiable information contained in the student's education records, except to the extent that FERPA authorizes disclosure without consent.
4. The right to request personally identifiable information, or directory information, not be made public.
5. The right to file a complaint with the U.S. Department of Education concerning alleged failure by NDSU to comply with the requirements of FERPA: U.S. Department of Education, Student Privacy Policy Office, 400 Maryland Avenue SW, Washington, DC 20202.

Grades and Grading

Grades and Honor Points

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

Grade Descriptions

Passing Grades

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

Non-passing Grades

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

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

Grade Point Average (GPA) Calculation

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

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

Course Failures

A failing (F) grade may not be removed by special examination or transfer credit. When a failing grade has been assigned, credit for that course may be earned only by repeating it at NDSU, or via Tri-College, and completing the course satisfactorily. Review the Repeated Courses (p. 43) policy for full details.

Pass-Fail Grading

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

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

Mid-Term Grading

As an early intervention effort to improve retention and academic progress of students, faculty are encouraged to enter deficient mid-term grades of D and F, at minimum, in undergraduate courses. Notifications are sent to students with reported deficient mid-term grades. Mid-term grades are not considered official grades and do not appear on student academic transcripts.

Final Grades

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

Grade Changes

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

Grade Appeals

If a grade dispute between the student and instructor is not resolved through the grade change process, the student may engage in the full, formal Grade Appeals process outlined within the NDSU Policy Manual, Section 337: Grade Appeals Board (https://www.ndsu.edu/fileadmin/policy/337.pdf). Grade appeals may only be considered for students who have not yet earned a degree.

Grades of Incomplete

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

1. The grade of Incomplete is assigned to indicate that satisfactory work has been completed up to within five weeks of the semester end, and that circumstances beyond the student's control prevented completion of the work. The time period is proportional for variable length courses and summer session.
2. The grade of Incomplete is not to be given in any instance where the student has a deficiency of more than five weeks (or equivalent) of work including final exam week.
3. Grades of Incomplete are initiated by student request. The student must contact the instructor, request an Incomplete grade, and, upon instructor approval, make arrangements to complete the work.
4. The grade of Incomplete (I) is an administrative grade that may only be entered by the Office of Registration and Records, except in courses designated as practicum, internship, individual study, field experience, or study abroad.
5. FORM and DEADLINE: An **Incomplete Grade Reporting Form** detailing the work to be completed, expected completion date (see #6), and grading standard is to be completed by the course instructor. This is an electronic form submitted to the Office of Registration and Records by the grade submission deadline for the semester in which the course was taken.
6. Grades of Incomplete, including those for most course types identified in #4, must be removed no later than the end of the seventh week of the next full semester (fall or spring) or by the completion date set by instructor if other than the standard seventh week. The time period is proportional for variable length courses and summer session.
7. Grades of Incomplete are removed when the student has completed all course requirements and the instructor of the course files a **Grade Reporting Form**.
8. All grades of Incomplete that are not removed within the specified time are automatically changed to 'F' grades by the Office of Registration and Records.
9. Instructors may specify completion deadlines for remaining work on the **Incomplete Grade Reporting Form** earlier than the standard deadlines.

10. Requests for extensions beyond the expected completion date require approval by both the instructor and the chair of the department offering the course. The extended deadline must be indicated on the **Incomplete Grade Reporting Form** and may not exceed two Incomplete conversion/deadline cycles. If a grade is not submitted by the specified deadline, the Incomplete grade will convert to a grade of 'F'. Contact Registration and Records for date extension.
11. Grades of Incomplete, which convert to grades of 'F', earned in the last semester of attendance by a student who leaves the university for two or more years may be changed to Withdrawn ('W') upon re-enrollment. Requests for this privilege must be filed with the Office of Registration and Records during the first term of re-entry.
12. An Incomplete grade may be converted to a letter grade (or P/F, S/U) according to the above guidelines, but may not be expunged from the record.
13. Students may not register in courses in which they currently hold grades of Incomplete, except for courses that are repeatable for credit.
14. Students are not allowed to graduate with Incomplete grades on their academic records. Upon graduation, unconverted Incomplete grades will convert to grades of 'F'. If a course in which an Incomplete grade was assigned is required for graduation, the instructor may extend the deadline according to the above procedures and timelines, and graduation will be postponed.
15. Students who receive grades of Incomplete or converted grades of F may appeal disputed grades in accordance with NDSU Policy, Section 337: Grade Appeals Board (https://www.ndsu.edu/fileadmin/policy/337.pdf).

Military and Veteran Certification

The Military and Veteran Certification Office is your one stop shop for everything military benefits. Whether you are a Guardsmen, Reservist, Active Duty, Veteran, or Dependent receiving benefits from a relative then you would go the Military and Veteran Certification Office first. Benefits differ based on your classification and status so visit with your School Certifying Official to learn more. Most programs include a monetary stipend and tuition assistance.

North Dakota guard members also receive a tuition waiver that pays for part of your tuition. If you are a North Dakota Resident and your parent or guardian is 100% disabled, there is a tuition waiver that covers the cost of tuition for 48 months. For more information, please visit your School Certifying Official. Contact information can be found on the Military and Veterans Certification (https://www.ndsu.edu/veterans/) website.

Project 65

Individuals aged 65 or over may audit one course per semester free of tuition and related mandatory fees as outline within North Dakota State Board of Higher Education Policy 805.3: Fees (https://ndusbpos.sharepoint.com/:w:/s/NDUSPoliciesandProcedures/EXZY1ANs-3lDtaHaQ4tJxKIBX3yID19gIa4hSi_pLCh79Q/?rtime=eOQStM8u2kg). First time Project 65 participants must complete an application through the Office of Admission to get started. Once the application is complete, participants are responsible for course selection and need to obtain a Class Permit from the academic department teaching the course. The instructor/department staff will issue the Class Permit with the Project 65 authorization. Class Permits must be received in accordance with published dates and deadline for the semester.

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

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

Registration

Students must be properly admitted and fully enrolled to attend classes. Students ultimately are responsible for all course registration activity and they are expected to monitor their schedule of classes and drop courses that they do not intend to complete by the published deadlines; this includes dropping individual courses or withdrawing from a semester. Dates and deadlines for advising and registration are made available in the Dates and Deadlines (https://www.ndsu.edu/onestop/dates-and-deadlines/) calendar posted online. Students are encouraged to visit with an academic adviser before registering for classes *(see* Academic Advising *(p. 29))*.Campus Connection is an online web-based system that students can access from a variety of web browsers, such as Firefox and Google Chrome. Registration instructions (https://www.ndsu.edu/registrar/registration/) are posted online.

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

- **Currently enrolled students:** Currently enrolled students or those who had registration in a prior standard semester (fall or spring) are assigned registration appointment times according to total credits earned. Registration appointments can be viewed on Campus Connection.
- **Returning students:** Returning students are those who have previously attended NDSU, but who have not been in attendance for at least one full semester (fall or spring). Returning students are assigned a registration appointment time according to total credits earned after the Reactivation/Petition for Readmission (https://www.ndsu.edu/onestop/undergraduate-reactivationpetition-readmission/) form is received and processed in the Office of Registration and Records. Students are notified of their readmission status via the email address the student provides on the Reactivation/Petition form. After processing and notification, student may view their registration appointment times via Campus Connection.

- **New students:** Detailed information regarding registration options is sent to all new students from Student Success Programs (https://www.ndsu.edu/studentsuccess/). Incoming freshmen, including first year students with transfer credit, will work with academic advisors to enroll in courses for their first semester.
- **Transfer students:** Admitted transfer students may register in Campus Connection or they may attend a transfer orientation and registration program. Transfer student registration appointment times are based on the total number of credits accepted in transfer to NDSU.

Financial Obligation Agreement

The North Dakota University System Financial Obligation Agreement (https://www.ndsu.edu/onestop/financial-obligation-agreement/) (FOA) is used to verify that a student has acknowledged their financial responsibility to the University when they register for courses. Students must access, review and accept the FOA prior to registration for each term of enrollment in Campus Connection. It is in the students' best interest to read the full terms of agreement as this agreement is enforced and the terms of financial obligation are upheld by the University.

Classroom Instruction Mode

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

- **On Campus Face to Face** - Describes the traditional classroom setting where the instructor and students are physically located in the same place and may incorporate the use of multiple supportive technologies as appropriate.
- **Off Campus Face to Face** - Describes the traditional classroom setting where the instructor and student are physically located in the same place in an off campus location and may incorporate the use of multiple supportive technologies as appropriate.
- **Online Asynchronous** - Online instruction occurring independent of time or location
- **Online Synchronous** - Online instruction occurring independent of location, but at the same time (real time).
- **Hybrid/Blended** - A form of instruction that includes students from different locations and/or environments (face-to-face, online, IVN, etc.) for synchronous and/or asynchronous instruction.
- **Independent Study** - Instruction is provided in a self-study, self-paced format where the instructor and student mutually establish method(s) of communication.

Changes in Registration

Registration deadlines for all courses are posted in the online Dates and Deadlines (https://www.ndsu.edu/onestop/dates-and-deadlines/) calendar. Deadlines for regular and variable length courses, as well as summer session courses, are adjusted proportionately. Students are always responsible for course registration activity and they are expected to review and monitor their schedule of classes and drop courses that they do not intend to complete by published dates and deadlines; this includes dropping individual courses or withdrawing from a semester. Questions related to registration should be directed to the Office of Registration and Records (https://www.ndsu.edu/registrar/).

Adding & Dropping Individual Courses

Enrollment Add Deadline

Students may add courses to their schedules via Campus Connection until the published deadline in the Dates and Deadlines calendar.

Class Permits

All students are expected to have added their courses via Campus Connection one week from the start of the semester. After the deadline to add via Campus Connection, 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. Courses will not be added to a student's record after the semester has concluded.

Dropping Courses

Students who register and determine they no longer wish to be enrolled in a class are responsible to drop the classes that they do not intend to complete. Students failing to drop courses by published deadlines will result in failing grades and debt owed the university based on the NDUS Financial Obligation Agreement (https://www.ndsu.edu/onestop/financial-obligation-agreement/) (FOA) that the student accepts when registering for classes. Students drop classes via Campus Connection through the semester drop deadlines published in the online Dates and Deadlines calendar. Students wishing to drop all of their classes in a semester need to refer to the Withdrawing to Zero Credits section below.

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

Administrative Drop

Administrative drops are used in courses with high demand that typically have significant wait list numbers. At no time should students rely on instructors or departments to administratively drop them from classes. 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 high demand lecture or laboratory course, or students who do not meet all course pre-requisites or co-requisites. Administrative course drop requests made by instructors/departments are submitted to the Office of Registration and Records within the first week of a class meeting for processing.

Withdrawing to Zero Credits in a Semester

- **Cancellation of Registration (before classes start)**

  Students who register and then decide not to attend NDSU **before** the semester start date must cancel their registration by submitting a Cancellation of Registration/Withdraw to Zero Credits (https://www.ndsu.edu/onestop/withdrawing-classes/?CONTEXTIDPARAMS=TEMPLATE_ID%3aPTPPNAVCOL&scname=G_NCOL_NDSU_NDUS_EFORMS&PanelCollapsible=Y&PTPPB_GROUPLET_ID=G_TILE_NDSU_NDUS_EFORMS&CRefName=G_T form. Forms must be submitted to NDSU One Stop. **It is not possible for a student to cancel registration online using Campus Connection; students must submit the form.** Cancellations are not accepted by telephone. Cancellations completed ***prior to the semester start date*** result in a full refund and no courses appear on the academic transcript.

- **Withdrawal to Zero Credits (after classes have started)**

  Students who have registered and then wish to drop all courses ***after the semester start date*** must officially withdraw from the university by submitting a Cancellation of Registration/Withdraw to Zero Credits (https://www.ndsu.edu/onestop/withdrawing-classes/?CONTEXTIDPARAMS=TEMPLATE_ID%3aPTPPNAVCOL&scname=G_NCOL_NDSU_NDUS_EFORMS&PanelCollapsible=Y&PTPPB_GROUPLET_ID=G_TILE_NDSU_NDUS_EFORMS&CRefName=G_T form by the semester deadline published on the Dates and Deadlines calendar. **It is not possible for a student to withdraw from all of their classes in a semester online using Campus Connection; students must submit the form.** Failure to initiate the withdrawal process will result in the grades earned in the course appearing on the academic transcript and financial obligations owed to the university. Tuition refund (https://www.ndsu.edu/onestop/effects-dropping-or-withdrawing/) information may be reviewed on the One Stop website. Steps to withdraw from all courses include the following:

1. Read and complete the Cancellation of Registration/Withdraw to Zero Credits form. Submit to NDSU One Stop.
2. Students are responsible for any unpaid bills at the time of withdrawal.
3. Withdrawal forms must be submitted by the published deadline of the semester. Withdrawals received after this date will not be processed. Students who have a documented compelling reason or circumstance which prevented them from submitting the Withdraw to Zero Credits form by the published deadline may appeal using the Missed Deadline Appeal (https://www.ndsu.edu/onestop/forms/) (grades not yet posted to record) or the Retroactive Withdraw Appeal (see the section below).
4. Students should not attempt to drop all of their courses, their last course, or their only course via Campus Connection.
5. Unlike refunds for individual course drops, withdrawal refunds (https://www.ndsu.edu/onestop/accounts/dropping_withdrawing/) are prorated and are based on complete withdrawals from all courses, course lengths, and withdrawal dates.
6. If a final grade for any course taken in the semester is posted to the NDSU transcript, students are not eligible to Withdraw to Zero Credits. Students may drop the remainder of courses in accordance with the published drop deadlines for the semester (see Adding/Dropping Individual Courses above). Students may view their unofficial transcript in Campus Connection.

Retroactive Withdrawals

Students seeking to withdraw after final grades have been posted to the academic transcript as a result of extenuating circumstances beyond their control, which is documented with dated evidence, may appeal for a retroactive withdrawal. Students must submit An *Appeal for Retroactive Withdrawal* prior to 3 years after the close of the term being requested. Retroactive withdrawals appeals *(*https://www.ndsu.edu/onestop/forms/***) must be considered for all courses taken in one or more semesters as a result of these extenuating circumstances; selective course drops are not allowed. Students are not eligible to request a retroactive withdrawal from any semester that contributes attempted credit to an earned degree and the degree GPA.** A student will complete the *Appeal for Retroactive Withdrawal*, which requires:

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

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

Auditing & Wait Listing Courses

Auditing Courses

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

Audit Process: A student is admitted to a class as an auditor when a Class Permit is issued by the course instructor or the academic department. The department or course instructor submits the Class Permit to the Office of Registration and Records for enrollment processing on or before the semester deadline published in the Dates and Deadlines Calendar. Once the audit registration is processed, the decision cannot be reversed.

Audit Fee: The audit fee is one-half of the regular tuition rate, based on the student's residency, and is included in the tuition cap. No student fees will be assessed.

Wait Listed Classes

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

Dual Career Registration

Students are permitted to register for classes according to their classification level with the university. However, there are instances when a graduate student may need to enroll in undergraduate courses as per-requisite preparation for a graduate program of study. In addition, on a limited basis, permission may be granted for an undergraduate student to take graduate level courses.

1. Graduate students who need to enroll in undergraduate coursework must follow the procedure below that most closely matches their academic intent. Students will complete and submit the Dual Career Registration (https://www.ndsu.edu/sites/default/files/onestop/Forms/dualugcourses.pdf) form for the following situations:
   - Undergraduate coursework is a prerequisite or condition of admission to a graduate program of study. Approval is granted by the Graduate School. The student will enroll for these courses on an undergraduate academic record and billing will be at the undergraduate rate.
   - A graduate student would like to take undergraduate coursework at the same time they are enrolled in graduate courses either as a non-degree seeking student or for an undergraduate program of study. For an undergraduate program of study, the student must submit either an Undergraduate Application for Admission (https://www.ndsu.edu/admission/admission_information/application/) (if never enrolled as an undergraduate at NDSU) to the Office of Admission or an Undergraduate Reactivation Form (https://www.ndsu.edu/onestop/undergraduate-reactivationpetition-readmission/) (if previously enrolled as an undergraduate at NDSU) to the Office of Registration and Records. The student will enroll in the undergraduate coursework on an undergraduate academic record and be billed at the undergraduate rate. Graduate tuition waivers will not cover undergraduate coursework. (Not for accelerated program. See #2 for approved accelerated programs)
   - On a limited basis and only with permission, undergraduate coursework may be applied to a graduate program of study (select programs only). Students must obtain approval from the Graduate School. The undergraduate 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 make application to the Graduate School and be admitted to take graduate level courses.
   - Applies to undergraduate students who have been approved for an accelerated program of study. Students must make formal application to the Graduate School and be accepted into an approved graduate program of study concurrently with an approved undergraduate program of study. Students enroll in graduate level coursework on an graduate academic record and are billed at the graduate rate. No more than 15 credits of graduate level coursework can be applied to an undergraduate program of study. Specific coursework is to be identified on the Accelerated Declaration form submitted to the Graduate School with the Graduate School application. The credit for the graduate courses is applied as transfer credit onto the undergraduate record to satisfy predetermined undergraduate major program of study requirements.

Collaborative Registration

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

1. A student must be enrolled in at least one degree credit course at NDSU before enrolling in a collaborative course including the summer semester. Excluded from this requirement are students using the faculty/staff tuition waiver.
2. Only fully admitted undergraduate and graduate students in good academic standing (GPA of 2.0 or higher) are allowed to enroll collaboratively. Students requiring ASC 86 or ASC 87 are exempt from the academic standing requirement.
3. The collaborative process allows NDSU to combine credits from more than one NDUS institution for the purpose of financial aid (for courses added through the seventh business day from the start of the term).
4. Collaborative courses are not subject to the NDSU tuition cap.
5. The provider institution's tuition/fees for collaborative course(s) are included in the student's accounts receivable balance at NDSU.
6. Not all scholarships will pay for collaborative tuition and fees assessed by the non-NDSU/provider campus. Please check with the awarding organization to confirm. NDSU-funded tuition discounts may not be applied to any collaborative charges.
7. Students must be in good financial standing to be eligible for collaborative course registration.
8. The student cannot exceed a total of 20 credits between NDSU and the provider institution(s) without special permission from the Registrar at home and provider campuses.
9. The student must follow NDSU's academic dates and deadlines for adding/dropping collaborative courses.
10. Drops/adds must be administered by submitting an updated collaborative registration form to the home institution. NDSU students may submit the form to the Office of Registration and Records, 110 Ceres Hall.
11. Courses will be posted to the NDSU academic record as transfer credit once NDSU receives an official transcript from the provider institution. ***Note:*** *Grades earned in collaborative courses may be used in determining financial aid satisfactory progress.*
    a. Graduate students using collaborative credits to satisfy NDSU graduate program degree requirements must either a) list the collaborative credits as transfer credits on their plan of study form, or b) submit the Request for Change to Plan of Study (https://powerforms.docusign.net/20c075c4-741c-4c43-8767-4c48338ddfaf/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) form and indicate which degree requirements the collaborative credits are satisfying on their advisement report.
12. Completion of the Collaborative Student Contract and Registration (https://www.ndsu.edu/onestop/forms/) form does not guarantee registration into the requested course(s). Registration is not considered completed until the student has received confirmation of enrollment from the provider institution. However, if the request(s) cannot be processed, the student will be notified via their NDSU e-mail address.
13. Collaborative registration is not an option for repeating courses previously taken at NDSU. If students wish to take advantage of the repeated course opportunity to improve a grade, that course must be repeated at NDSU.
14. Due to federal compliance, course repeats via collaborative registration will be prohibited to prevent significant federal financial aid impacts which could result in over-payment of federal financial aid funds.
15. The option to wait-list is subject to the provider institution's discretion and does not guarantee enrollment into the requested course(s).

Summer Registration

The 12-week summer session is designed to provide instruction within various time intervals throughout the summer. Classes are offered in several sessions throughout the summer. While the time interval of the individual sessions is different than that of the standard semester (16 weeks), each course carries full credit because classes meet the same number of contact hours as in the standard fall or spring semesters. In addition, deadlines for summer session courses are adjusted proportionately. Students are responsible for making changes to their registration according to published summer Dates and Deadlines calendar. (https://www.ndsu.edu/onestop/dates-and-deadlines/)

Each college or department determines its summer offerings. The summer session course offerings schedule is available in Campus Connection. For more information about summer schedule visit the Summer Schedule website (https://www.ndsu.edu/summer/).

Fees and Housing

Summer tuition and fees are available online (https://www.ndsu.edu/onestop/accounts/tuition/). Information concerning summer housing may be secured by contacting the Department of Residence Life (https://www.ndsu.edu/reslife/), Dept. 5310, P.O. Box 6050, Fargo, ND 58108, or 701-231-7557 (toll-free 1-800-572-8840).

Graduate Work

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.

Repeated Courses

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

1. Credit earned in any given course (or equivalent course) is applicable to a degree requirement only once; therefore the course repeat option to improve the cumulative GPA is only available to students who have not earned a degree. Repeat attempts made in semesters following a degree posting will remain on the academic record along with the new grade, but the credit and honor points are excluded from cumulative GPA and credit calculations, and the repeated course will be marked "Repeated: Post Degree-Not Included in Cum Totals."
2. If a course is completed at NDSU first and an attempt is made to repeat that course at another institution, the credit is considered duplicate and is not eligible for transfer back to NDSU.
3. An NDSU student may register for a Tri-College course to repeat a course previously taken at NDSU. Tri-College (https://www.ndsu.edu/onestop/registration/tricollege/) enrollment rules and restrictions apply.
4. All grade entries remain on the student's academic record, but only the credits, grades and related honor points for the most recent attempt are calculated in the cumulative grade point average and credits for graduation. Students forfeit the previous letter grade no matter what letter grade was earned. Previous letter graded attempts are excluded from cumulative totals and marked as '*Repeat Excluded*' on the record.The most recent letter graded course is marked '*Repeat Included*' on the record.
5. There is no limit to the number of different courses that may be repeated unless otherwise restricted by an academic department.
6. Courses initially taken with A-F letter grading may not be repeated if the pass-fail grading option is elected in the repeat attempt.

NOTE: Repeating courses has impacts to financial aid eligibility and can effect a student's completion rate.

Student Credit Load

	Enrollment Status	Eligibility for MOST Federal Financial Aid	Tuition Cap	Max Credits for Registration
	Status used for loan deferments, enrollment verifications, etc.	(Student must be eligibile) Varies by type of aid (refer to Student Financial Services)*	Credits over the cap are at no additional cost to the student. Tuition cap refers to NDSU tuition charges only.	The max credits that students can enroll in per semester.**
UGRD - Fall/Spring/Summer Semester	Half-time= 6 cr.; Full-time=12 cr.	6 cr. minimum half-time aid; 12 cr. for full-time aid	13 cr.	20 cr. (15 for summer)
PROF PHARM - Fall/Spring/Summer Semester	Half-time=5 cr.; Full-time=9 cr.	Half-time=5 cr.; Full-time=9 cr.	13 cr.	20 cr (15 for summer)
GRAD - Fall/Spring/Summer Semesters	Half Time=5 cr. Full Time=9 cr.	5 cr. minimum half-time aid 9 cr. for full-time aid	No tuition cap, except ARCH at 13 cr.	15 cr. (may vary by program)

Undergraduate Students

The recommended credit load for undergraduate students is 15-18 hours per semester during a standard academic term (fall/spring). Undergraduate and professional student full time status is 12 or more credits per semester. Half time is 6 credits per semester. Undergraduate students are limited to 20 credits per semester (15 credits in the summer). Students who find it necessary to exceed this credit limit must have an NDSU minimum institutional grade-point average of 3.0 to be eligible to petition for an overload. The Petition to Exceed Maximum Credit Load (https://www.ndsu.edu/registrar/forms/) is available online.

Graduate Students

Graduate student full time status is 9 or more credits per semester. Half time is 5 credits per semester. Graduate students may enroll in up to 15 credits per semester. Students wanting to exceed the credit limit must submit the Over 15 Credit Petition (https://www.ndsu.edu/gradschool/current_students/forms/#:~:text=Over%2015%20Credits%20Petition) form.

Student Transcripts

Transcripts

Current students may request an official NDSU transcript through the online Campus Connection portal using an active login and password. Former students may request an official transcript in either hard copy or electronic format through Parchment (https://www.parchment.com/u/registration/34559/institution/). Parchment online ordering provides 24/7 access with 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/onestop/official-transcript/) for detailed transcript fee information. The transcript only includes detailed work completed at NDSU. Requests for transcripts of work completed elsewhere must be made directly with the respective institution.

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

Correction of Transcript Errors

If a student believes there is an error in the recording of a course grade on the transcript, the student should first contact the instructor to verify the grade. Other transcript questions or concerns should be directed to the Office of Registration and Records (https://www.ndsu.edu/registrar/). See also the sections on Grade Changes and Appeals (p. 37).

Tri-College University

Tri-College University (https://www.tri-college.org/) (TCU) 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. Students at the five schools may benefit from what each institution offers individually and cooperatively through the consortium.

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

Tuition and Fees

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

Students enrolling in classes that require special fees (lab/course fees, lessons, supplies, etc.) beyond the home-campus tuition and fees assessed at the time of registration will be responsible for remittance of payment to the provider institution. The following information can be found on the TCU Registration form (https://www.tri-college.org/fileadmin/tri-college.org/Current_Forms/TCU_Registration_Form_FINAL.pdf) and information guide (https://www.tri-college.org/fileadmin/tri-college.org/Current_Forms/TCU_Information_Guide_FINAL.pdf).

Course Limits

The TCU Course Exchange is limited to two courses per student per semester per participating campus, and only if the courses are not cataloged or offered on the student's home campus in a given semester. Exceptions to the two-course/semester limit among campuses are detailed, along with other TCU registration information. 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 courses at Concordia—may take only two courses per term and then, only if they are full-time students and only if that course is not available on their home campus during that academic term. Concordia does not participate in the TCU course exchange during the summer.

Credits and Grades

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

Course Substitutions

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

Course Repeats

Students taking a TCU course to repeat a course previously taken at the home campus must indicate this on the registration form. Duplication of credit is not permitted.

Policies and Deadlines

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

Registration

NDSU students register by submitting the Tri-College registration form to the Office of Registration and Records, 110 Ceres Hall.

Tri-College Minors

The Tri-College partners recognize minors earned through the TCU course exchange. Minors are available to students at Concordia, MSUM, and NDSU. Students receive recognition on their academic transcript for minors completed on one of the other TCU campuses. This policy applies only to minors earned in programs not available on a student's home campus. The TCU Minor form (https://www.tri-college.org/fileadmin/tri-college.org/Current_Forms/TCU_Minor_Form_FINAL.pdf) is available online.

Majors

Majors may be earned only at the school from which a student earns a degree. Most students enroll initially at the school from which they intend to graduate. However, the TCU course exchange agreement between MSUM and NDSU allows a student to begin their studies at one of the schools prior to transferring to the other school to complete their degree. Tri-college students typically are restricted to pre-professional coursework at a campus that offers a professional program of study. Students should work with the chair of the department in which they intend to major to make sure their program includes all requirements for the major and for graduation.

Library Services

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

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

Bus and Parking Services

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

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

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

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

Undergraduate Policies

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- AP Exam
- CLEP Exam
- DSST Exam
- IB Program
- Course Challenge

English and Mathematics Placement (p. 52)

General Education (p. 55)

- General Education Category Descriptions
- Learning Outcomes
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- Gen Ed Courses
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Undergraduate Classification (p. 66)

Undergraduate Degree & Graduation Requirements (p. 66)

- Baccalaureate Degree and Graduation Requirements
- Major/Minor/Certificate Requirements
- Bachelor of Arts Requirement Using a Second Language
- Graduation with Honor
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Transfer and Test Credit (p. 70)

- Evaluation of Transfer Credit from U.S. Institutions
- Evaluation of Transfer Credit from International Institutions
- Common Course Numbers
- Evaluation of Transfer Credit from Military Courses

Academic Standing (p. 71)

- Academic Progress
- Dean's List
- Academic Forgiveness

Credit By Examination

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

Advanced Placement Examination (AP)

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

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

Examination	Score	Equivalent NDSU Course	Credit Hours	Gen Ed Category
Art-History	3	ART 210 & ART 211	6	A & A
Biology	3	BIOL 111 & BIOL 100L	4	S/L & S/L
Biology	4	BIOL 150, BIOL 150L, BIOL 151, & BIOL 151L	8	S/L, S/L, S/L, & S/L
Calculus AB	3	MATH 165	4	R
Calculus BC	3	MATH 165 & MATH 166	8	R & R
Chemistry	3	Free Elective (CHEM 1XX)*	4	S/L
Chemistry	4	CHEM 121, CHEM 121L, CHEM 122, & CHEM 122L	8	S/L, S/L, S/L, & S/L
Chinese Language & Culture	3	Free Elective (TRNSFR 1XX)*	3	A/D
Comparative Government & Politics	3	POLS 225	3	B
Computer Science A	3	CSCI 160	4	S
Computer Science AB	3	CSCI 160 & CSCI 161	8	S & S
Computer Science Principles	4	CSCI 159	3	R
English Language & Composition	3	ENGL 110 (or ENGL 112)	3	C
English Literature & Composition	3	ENGL 220	3	A/D
English Literature & Composition	4	ENGL 110 & ENGL 220	6	C & A/D
Environmental Science	3	BIOL 124 & BIOL 100L	4	S/G & S/L
European History	3	HIST 101 & HIST 102	6	A & A
French Language & Culture	3	FREN 101 & FREN 102	8	A/D & A/G
German Language	3	GERM 101 & GERM 102	8	A/D & A/G
Human Geography	3	GEOG 151	3	B/G
Italian Language & Culture	3	Free Elective (TRNSFR 1XX)*	3	A/D
Japanese Language & Culture	3	Free Elective (TRNSFR 1XX)*	3	A/D
Latin	3	Free Elective (TRNSFR 1XX)*	3	A/D
Macroeconomics	3	ECON 202	3	B/G
Microeconomics	3	ECON 201	3	B/G
Music Theory	3	Free Elective (MUSC 1XX)*	6	A
Physics I: Algebra-Based	3	Free Elective (PHYS 1XX)*	4	S/L
Physics I: Algebra-Based	4	PHYS 211 & PHYS 211L	4	S/L & S/L
Physics II: Algebra-Based	4	PHYS 212 & PHYS 212L	4	S/L & S/L
Physics C - Electricity & Magnetism	3	PHYS 212 & PHYS 212L	4	S/L & S/L
Physics C - Electricity & Magnetism	4	PHYS 252 & PHYS 252L	5	S/L & S/L
Physics C - Mechanics	3	PHYS 211 & PHYS 211L	4	S/L & S/L
Physics C - Mechanics	4	PHYS 251 & PHYS 251L	5	S/L & S/L
Psychology	3	PSYC 111	3	B
Research	3	Free Elective (TRNSFR 1XX)	3	
Seminar	3	Free Elective (TRNSFR 1XX)	3	
Spanish Language	3	SPAN 101 & SPAN 102	8	A/D & A/G
Spanish Literature & Culture	3	Free Elective (SPAN 1XX)*	3	A
Statistics	3	Free Elective (STAT 1XX)*	3	R
Statistics	4	STAT 330	3	R

Studio Art-2D Design Portfolio	3	ART 122	3	A
Studio Art-3D Design Portfolio	3	ART 124	3	A
Studio Art-Drawing Portfolio	3	ART 130 & ART 230	6	A & A
U.S. Government & Politics	3	POLS 115	3	B
U.S. History	3	HIST 103 & HIST 104	6	A & A
World History: Modern 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 *(p. 55) 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 is provided by CollegeBoard.

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. Credit earned through CLEP is not residence credit and may not be used to satisfy residence-credit requirements for graduation.

CLEP Examinations

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

Examination	Score	Equivalent NDSU Course	Credit Hours	Gen Ed Category
American Government	50	POLS 115	3	B
American Literature	50	ENGL 261 & ENGL 262	6	A & A
Analyzing & Interpreting Literature	50	ENGL 272 & Free Elective (ENGL 1XX)*	6	
Biology	50	BIOL 150 & BIOL 150L	4	S/L & S/L
Calculus	50	MATH 146	4	R
Chemistry	50	CHEM 121 & CHEM 121L	4	S/L & S/L
College Algebra	50	MATH 103	3	R
College Composition	50	ENGL 110	3	C
College Composition Modular	50	ENGL 110	3	C

College Mathematics	50	Free Elective (MATH 1XX)*	3	
English Literature	50	ENGL 251 & ENGL 252	6	A & A
Financial Accounting	50	ACCT 200	3	
French Language Level I	50	FREN 101	4	A/D
French Language Level II	59	FREN 101 & FREN 102	8	A/D & A/G
German Language Level I	50	GERM 101	4	A/D
German Language Level II	60	GERM 101 & GERM 102	8	A/D & A/G
History of the United States I	50	HIST 103	3	A
History of the United States II	50	HIST 104	3	A
Human Growth & Development	50	PSYC 250	3	B
Humanities	50	Free Elective (HUM 1XX)*	3	
Information Systems	50	Free Elective (CSCI 1XX)*	2	S
Introduction to Educational Psychology	50	Free Elective (TRNSFR 1XX)*	3	B
Introduction to Business Law	50	Free Elective (TRNSFR 1XX)*	3	
Introduction to Psychology	50	PSYC 111	3	B
Introduction to Sociology	50	SOC 110	3	B
Natural Sciences	50	Free Elective (TRNSFR 1XX)*	3	
Pre-Calculus	50	MATH 107	3	R
Principles of Macroeconomics	50	ECON 202	3	B/G
Principles of Management	50	Free Elective (TRNSFR 1XX)*	3	
Principles of Marketing	50	Free Elective (TRNSFR 1XX)*	3	
Principles of Microeconomics	50	ECON 201	3	B/G
Social Sciences & History	50	Free Elective (TRNSFR 1XX)*	3	
Spanish Language Level I	50	SPAN 101	4	A/D
Spanish Language Level II	63	SPAN 101 & SPAN 102	8	A/D & A/G
Western Civilization I: Ancient Near East to 1648	50	HIST 101	3	A
Western Civilization II: 1648 to the Present	50	HIST 102	3	A

*
Credit received applies toward degree elective credit

General Education Categories:

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

See General Education Requirements *(p. 55) for more information on core NDSU courses*.

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

Phone: (800) 257-9558
Email: clep@collegeboard.org

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

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

DSST Examinations

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

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

Examination	Score	Equivalent NDSU Course	Credit Hours	Gen Ed Category
A History of the Vietnam War	44	Free Elective (HIST 1XX)*	3	
Art of the Western World	48	ART 111	3	A
Astronomy	48	PHYS 110	3	S
Business Law	44	Free Elective (TRNSFR 1XX)*	3	
Business Mathematics	400	Free Elective (TRNSFR 1XX)*	3	
Civil War & Reconstruction	47	Free Elective (HIST 1XX)*	3	
Contemporary Western Europe	45	HIST 102	3	A
Criminal Justice	400	CJ 201	3	
Environment & Humanities	46	Free Elective (TRNSFR 1XX)*	3	
Environmental Science	400	BIOL 124	3	S/G
Ethics in America	400	PHIL 210	3	
Foundations of Education	46	Free Elective (TRNSFR 1XX)*	3	
Fundamentals of College Algebra	400	MATH 103	3	R
Fundamentals of Counseling	45	Free Elective (TRNSFR 1XX)*	3	
General Anthropology	47	ANTH 111	3	B/D
Here's to Your Health	400	HNES 217	3	W
Human Resource Mangement	46	Free Elective (TRNSFR 1XX)*	3	
Human/Cultural Geography	47	GEOG 151	3	B/G
Intro to the Modern Middle East	47	Free Elective (TRNSFR 1XX)*	3	
Intro to Business	400	Free Elective (TRNSFR 1XX)*	3	
Intro to Computing	400	Free Elective (TRNSFR 1XX)*	3	
Intro to Law Enforcement	45	Free Elective (TRNSFR 1XX)*	3	
Lifespan Development Psychology	46	PSYC 250	3	B
Management Information Systems	400	Free Elective (TRNSFR 1XX)*	3	
Money & Banking	48	Free Elective (TRNSFR 1XX)*	3	
Organizational Behavior	48	Free Elective (TRNSFR 1XX)*	3	
Personal Finance	400	Free Elective (TRNSFR 1XX)*	3	
Physical Geology	46	Free Elective (GEOL 1XX)*	3	S/G
Principles of Finance	400	Free Elective (TRNSFR 1XX)*	3	
Principles of Financial Accounting	49	ACCT 200	3	
Principles of Statistics	48/400	Free Elective (STAT 1XX)*	3	
Principles of Supervison	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 *(p. 55) for more information on core NDSU courses*.

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

International Baccalaureate (IB)

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

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

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

HL Literature & Performance	4	Free Elective (COMM 1XX)	3	
HL Mathematics javascript:void(0)	4	MATH 103, MATH 105	6	R, R
HL Physics	5	Free Elective (PHYS 1XX)*	4	
HL Psychology	4	PSYC 111	3	B
HL Spanish B	5	SPAN 101, SPAN 102, SPAN 201	11	A/D, A/G, A/D

*
Credit received applies toward degree elective credit

General Education Categories:

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

See General Education Requirements (p. 55)*for more information on core NDSU courses*.

To order official transcripts, please contact:

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

Course Challenge

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

Procedures for pursuing a course challenge include the following

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

English and Mathematics Placement

Undergraduate students are placed into English and mathematics courses in accordance with the North Dakota State Board of Higher Education course placement policy 413 (https://ndusbpos.sharepoint.com/:w:/s/NDUSPoliciesandProcedures/Eacm2xutfb9Gp5S8P5GL4b0BrUq5pIRVB4u5pNSlF4YjfQ/?e=ZQTozp) and procedure 413.1 (https://ndusbpos.sharepoint.com/:w:/s/NDUSPoliciesandProcedures/EbApPAwqaedGh6E5skti4FIBQZq7K48UXVoNqvOE3A1WhQ/?e=RHhl14). The intent of placement is to ensure students are appropriately placed based on their demonstrated readiness.

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

- All students are required to successfully earn credit for ENGL 110 and 120 or equivalent as part of the NDSU general education requirements.
- For students who have multiple placement exam scores, the highest placement may be used.
- Eligible students with disabilities may seek reasonable accommodations to take the placement test. Please submit disability documentation to NDSU Disability Services at least two weeks prior to the time in which the accommodations are needed. Documentation will be reviewed and students will be notified if additional documentation is needed to make an eligibility decision. Please submit the request and documentation to: NDSU Disability Services (https://www.ndsu.edu/disabilityservices/); Dept. 2860; P.O. Box 6050; Fargo, ND 58108-6050; (701) 231-8463.
- Students who have not submitted any of the approved English placement examinations are required to take the NDSU English Placement Survey. Acceptable placement exams are listed in the table below. Questions about the NDSU English Placement Survey can be directed to NDSU One Stop (https://www.ndsu.edu/onestop/).
- Students who have submitted placement scores, may elect to take the NDSU English Placement Survey to attempt to place into a higher English course. ENGL 120 is the highest placement attainable.
- Students who place into ASC 86 or ASC 87 developmental English courses are required to enroll through the collaborative student registration (p. 41) process delivered by North Dakota State College of Science (https://www.ndscs.edu/current-students/student-success/test-center/) (NDSCS). Course textbooks for ASC 87 may be purchased through the NDSU bookstore (http://www.ndsubookstore.com/).
- Upon completion of ENGL 120 with a 'C' grade or higher, students will be awarded placement credit (3) for ENGL 110.
- Students who transfer ENGL 120 with a grade of 'C' or higher to NDSU will be awarded placement credit (3) for ENGL 110.
- Students who transfer in ENGL 110 with a non-passing grade, may elect to take the NDSU English Placement Survey.
- Students with a MELAB score should contact the IELP coordinator (http://www.ndsu.edu/modernlanguages/department_directory/) for information on English placement.

NDSU English Placement Survey Scoring Guide
Score Range 1-8: ASC 087

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

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

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

Score Range 17-20: English 110

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

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

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

Score Range 35-40: English 120

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

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

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

English ACT Subtest Score	SAT Writing	ACT Aspire	Smarter Balanced 11/12 Grade(ELA)	Accuplacer WritePlacer Test Score	Accuplacer Next-Generation Writing	MyFoundationsLab Pearson (CREAM CLEM & Others)	NDSU Course Placement
13 or lower	Evidence-based reading & writing: 470 or lower	425 or lower	2 or lower	4 or lower	249 or lower	69% or lower	English Placement Survey

14-17	Evidence-based reading & writing: 480	426 or higher	3 or higher	5	250-255	70% or higher	ENGL 110
18 or higher	Evidence-based reading & writing: 480	-	-	6-8	256 or higher	-	ENGL 120

English Placement for International Students

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

Exam Type	LANG 109: Language Use in Writing ESL II	ENGL 112: ESL College Composition I	ENGL 122: ESL College Composition II
TOEFL iBT	70 or lower	71 or higher	English Placement Survey
IELTS (Overall)	5.5 or lower	6.0 or higher	English Placement Survey
Duolingo English Exam	99 or lower	100 or higher	English Placement Survey
SAT Evidence-based reading & writing	400 or lower	410 or higher	English Placement Survey
ACT English Subscore	13 or lower	14 or higher	English Placement Survey

NDSU Math Placement Procedures

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

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

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

The table below identifies NDSU approved placement examinations and minimum exam scores for placement into MATH 103 or Math 104:

Test	Test Component	Minimum Score
ACT	Math Subtest	21
SAT	MATH	530
SAT (prior to 2/05/2016)	Math + Reading	990
Accuplacer Next-Generation	Quantitative Reasoning, Algebra, and Statistics	255
Accuplacer Next-Generation	Advanced Algebra Functions	237
ACT Aspire	Math Subtest	431
ALEKS	Mathematics PPL	46
MyFoundationsLab Pearson (CREAM, CLEM & Others)	Math	70%
EdReady (NROC)	Math Placement	75
MAA Maplesoft	Algebra	12
Smarter Balanced	Grade 11-12 Math	3

The Table below identifies NDSU Pearson Placement exam scores and corresponding Math course placement at NDSU:

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

*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 (p. 46) guidelines for placement into mathematics and English coursework.

Sequence of NDSU math courses as a reference or guide:

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

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

MATH 98* > MATH 104

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

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

General Education

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

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**

Category S: Science and Technology †	**10**
Category A: Humanities and Fine Arts †	**6**
Category B: Social and Behavioral Sciences †	**6**
Category W: Wellness †	**2**
Category D: Cultural Diversity *†	
Category G: Global Perspectives *†	
Total Credits	**39**

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

General Education Category Descriptions

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

- **Communication (C)** is the clear, precise, and purposeful exchange of information in a variety of contexts, using either written or oral means.
- **Cultural diversity (D)** focuses on the social, personal, and interpersonal effects of variety and differences among cultures.
- **Fine arts (A)**, as an integral component of the humanities, promote the appreciation of aesthetics and the expression of creativity.
- **Global perspectives (G)** focus on analysis of worldwide issues illustrating the interdependence of the world and its people.
- **Humanities (A)** systematically explore cultural and intellectual forces shaping events, individual expression, and social values.
- **Quantitative reasoning (R)** is an organized set of quantitative methods used to solve problems or extend knowledge. Quantitative methods are a set of principles and procedures that could be used to manipulate numerical data.
- **Science (S)** is an organized body of knowledge, including principles and procedures based on scientific methods, used to explain physical or biological phenomena.
- **Social and behavioral sciences (B)** use scientific methods to analyze the behaviors, structures, and processes of individuals and groups.
- **Wellness (W)** is a dynamic and integrative process of becoming aware of healthy lifestyles, of learning to make informed choices, and of developing a balanced approach to living.

General Education Program Assessment

General education assessment has three basic purposes:

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

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

General Education Transfer

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

NDSU Global Seminar and Global Practicum Courses

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

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

for the category being sought. Approval is a one-time event and is not extended to additional semesters. Only students who enroll in the class and complete the experience are eligible for general education.

General Education Learning Outcomes

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

Communication (C) - students will

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

Quantitative Reasoning (R) - student will

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

Science & Technology (S)

Technology Learning Outcome- students will

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

Natural and Physical Sciences Learning Outcome - students will

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

Humanities & Fine Arts (A) - students will

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

Social & Behavioral Sciences (B) - students will

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

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

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

Cultural Diversity (D) - students will

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

Global Perspectives (G) - students will

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

General Education Administrative Policies

1. General education courses may be used to satisfy requirements for both general education requirements and the major, minor, and program emphases, where applicable.
2. Departments or colleges may preclude their students from double counting general education courses with major courses.
3. Except for courses that meet the cultural diversity or global perspectives requirements, no course can fulfill the requirements for more than one general education category.
4. General education requirements can be met through credit by exam, departmental examinations, or equivalents.
5. General education requirements can be met by successful completion of a course for which an approved general education course in the same department is a prerequisite or by successful completion of an advanced course in the same department with comparable course content.
6. Except for courses offered only on a pass/fail basis, no courses taken to meet the general education requirements may be taken for pass/fail grades. (Exception for Spring and Fall 2020: Students were allowed to complete general education requirements with a pass grade.)
7. The general education minimum requirements apply to all baccalaureate degree programs.
8. Transfer students who have only partially fulfilled general education category requirements by transfer-approved courses must complete the requirements in approved courses within the NDSU deficient categories. No category credit requirement may be deficient by more than a partial semester credit. However, in the communication category, if the transfer course(s) have been evaluated as equivalent to ENGL 110 College Composition I, ENGL 120 College Composition II, and COMM 110 Fundamentals of Public Speaking and total no less than eight semester credits, the lower-division category requirement has been met.
9. Students may receive placement credit for ENGL 110 College Composition I based on a minimum English ACT score (or SAT equivalent) and satisfactory performance (grade of 'C' or better) in ENGL 120 College Composition II or equivalent.
10. A student who has completed an associate of arts or an associate of science degree in the United States or Canada at a regionally accredited institution and who transfers to NDSU or who pursues a second baccalaureate degree at NDSU is considered to have completed his or her lower-division general education requirements at NDSU. Transfer student coursework from outside the United States and Canada will be evaluated on a course-by-course basis.
11. General education courses at other accredited institutions, which do not have equivalent courses or general education status at NDSU, may be accepted in transfer as part of the general education requirements at NDSU.
12. All general education course syllabi and course web sites must identify the course as having been approved for meeting general education requirements and include the general education outcomes for which each course is approved. (See Syllabus Requirements (https://www.ndsu.edu/facultysenate/committees_1/ucc/syllabus_information/))
13. Students who have completed basic military training (which is the commitment for enlistment) will receive a waiver for the Wellness category. Military record documentation is required for the waiver; documentation is to be submitted to the Office of Registration and Records with a completed Appeal for Exception to General Education Requirements form. The waiver for the training will not lead to course credit, and all other minimum graduation requirements apply.
14. Military Services members that have been deployed to a foreign country for a minimum period of 90 consecutive days will be recognized as meeting Global Perspectives general education requirement. Additionally, services members will have satisfied the Cultural Diversity requirement for completing an additional 90 days of foreign deployment. A copy of the military deployment documentation can be submitted with a completed Appeal for Exception to General Education Requirements form.
15. Students must complete at least four credits of natural and physical sciences in the Science and Technology category. Also in this category, a student must complete a one-credit lab taken as a co-requisite with an approved general education science and technology lecture course, unless the approved science and technology course has an embedded lab experience equivalent to one-credit (ex. CHEM 117 & CHEM 117L; PLSC 110).

General Education Courses

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

Category C: Communications - 12 credits

- 3 of the 12 credits must be at the 300/400 level upper-division

Code	Title	Credits
ENGL 110	College Composition I	3
or ENGL 112	Multilingual College Composition I	
ENGL 120	College Composition II	3
or ENGL 121	Honors Composition II	
or ENGL 122	Multilingual College Composition II	
COMM 110	Fundamentals of Public Speaking	3
or COMM 111	Honors Public Speaking	

ECON 356	History of Economic Thought	3
ENGL 320	Business and Professional Writing	3
ENGL 321	Writing in the Technical Professions	3
ENGL 322	Writing and the Creative Process	3
ENGL 324	Writing in the Sciences	3
ENGL 325	Writing in the Health Professions	3
ENGL 326	Writing in the Design Professions	3
ENGL 357	Visual Culture and Language	3
ENGL 358	Writing in the Humanities and Social Sciences	3
ENGL 459	Researching and Writing Grants and Proposal	3
FREN 360	Studies in Language and Style	3
HIST 390	Historical Research and Writing	3
PHIL 352	Knowledge and Reality	3
PHIL 450	Metaphysics	3
PHIL 451	Skepticism and the Possibility of Knowledge	3
PHRM 324	Writing and Professionalization in Pharmacy	3
SPAN 401	Advanced Spanish Grammar and Writing	3

Category R: Quantitative Reasoning - 3 credits

Code	Title	Credits
CSCI 122	Visual BASIC	3
CSCI 159	Computer Science Problem Solving	3
MATH 104	Finite Mathematics	3
MATH 144	Mathematics for Business	4
MATH 146	Applied Calculus I	4
MATH 165	Calculus I	4
PHIL 257	Traditional Logic	3
STAT 330	Introductory Statistics	3

CATEGORY S: Science & Technology - 10 Credits

- Four of the 10 credits must be in natural or physical sciences
- A co-requisite, one-credit lab must be taken with a natural or physical science course unless the course includes an embedded lab experience equivalent to a one-credit course.

Natural Science (Sn):

Code	Title	Credits
AGRI 115	Wonders of Weather	3
BIOL 100L	Non-Majors Biology Lab *	1
BIOL 111	Concepts of Biology	3
BIOL 124	Environmental Science	3
BIOL 126	Human Biology	3
BIOL 220	Human Anatomy and Physiology I	3
BIOL 220L	Human Anatomy and Physiology I Laboratory	1
BIOL 315	Genetics	3
or PLSC 315	Genetics	
BIOL 315L	Genetics Laboratory	1
or PLSC 315L	Genetics Laboratory	
CFS 210	Introduction to Food Science and Technology	3
GEOL 201	Climate Change and Energy	3
HON 342	Colloquium in the Sciences	3
MICR 100	Famine, Plague, and Cheese. Microbes: the cause and solution to the world's problems	3
MICR 202	Introductory Microbiology	2

MICR 202L	Introductory Microbiology Lab	1
NRM/RNG 225	Natural Resources & Agrosystems	3
PLSC 110	World Food Crops	3
PLSC 111	Genetics and You	2
PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1
SOIL 217	Introduction to Meteorology & Climatology	3

*

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

Physical Science (Sp):

Code	Title	Credits
CHEM 117	Chemical Concepts and Applications	3
CHEM 117L	Chem Concepts and Applications Lab	1
CHEM 121	General Chemistry I	3
CHEM 121L	General Chemistry I Laboratory	1
CHEM 122	General Chemistry II	3
CHEM 122L	General Chemistry II Laboratory	1
GEOL 105	Physical Geology	3
GEOL 105L	Physical Geology Lab	1
GEOL 106	The Earth Through Time	3
GEOL 106L	The Earth Through Time Lab	1
GEOL 107L	Geology of the Red River Valley May be taken as a co-requisite lab if taken with GEOL 105 or GEOL 106.	1
GEOL 219	Oceanography	3
PHYS 110	Introductory Astronomy	3
PHYS 110L	Introductory Astronomy Lab	1
PHYS 120	Fundamentals of Physics	3
PHYS 120L	Fundamentals of Physics Laboratory	1
PHYS 211	College Physics I	3
PHYS 211L	College Physics I Laboratory	1
PHYS 212	College Physics II	3
PHYS 212L	College Physics II Laboratory	1
UNIV 150	Foundations of Science	3
UNIV 151	Science and Society	3

Technology (St):

Code	Title	Credits
CSCI 114	Computer Applications	3
or TL 116	Business Software Applications	
CSCI 160	Computer Science I	4

CATEGORY A: Humanities & Fine Arts - 6 Credits

Code	Title	Credits
ARMD 210	Dress in World Cultures	3
ARMD 310	History of Fashion	3
ARCH 321	History and Theory of Architecture I	3
ARCH 322	History and Theory of Architecture II	3
ART 110	Introduction to the Visual Arts	3
ART 111	Introduction to Art History	3
ART 130	Drawing I	3
ART 153	Design Thinking and Creative Strategy	3

ART 210	Art History I	3
ART 211	Art History II	3
BUSN 211	World Culture and Food Service	3
ENGL 150	Being Human	3
ENGL 220	Introduction to Literature	3
ENGL 225	Introduction to Film	3
ENGL 229	Introduction to Creative Writing	3
ENGL 240	World Literature Masterpieces	3
ENGL 251	British Literature I	3
ENGL 252	British Literature II	3
ENGL 261	American Literature I	3
ENGL 262	American Literature II	3
ENGL 330	Women's Writing	3
ENGL 333	Fantasy and Science Fiction	3
ENGL 335	Multicultural Writers	3
ENGL 336	Literature and The Environment	3
ENGL 340	19th Century American Fiction	3
ENGL 341	Contemporary American Fiction	3
ENGL 345	Themes in American Culture	3
ENGL 375	The Bible as Literature	3
ENGL 380	Shakespeare	3
ENGR 327	Ethics, Engineering, and Technology	3
or PHIL 327	Ethics, Engineering, and Technology	
ENVD 101	Introduction to Environmental Design	3
FREN 101	First-Year French I	4
FREN 102	First-Year French II	4
FREN 201	Second-Year French I	3
FREN 202	Second-Year French II	3
GERM 101	First-Year German I	4
GERM 102	First-Year German II	4
GERM 201	Second-Year German I	3
GERM 202	Second-Year German II	3
GERM 220	German Culture & Society	3
HIST 101	Western Civilization I	3
HIST 102	Western Civilization II	3
HIST 103	U.S. to 1877	3
HIST 104	U.S. Since 1877	3
HIST 130	The American Presidency	3
HIST 140	History of the Holocaust	3
HIST 175	Pirates of the Caribbean	3
HIST 270	American Religious History	3
or RELS 270	American Religious History	
HIST 271	Introduction to Latin American History	3
HIST 311	History of Technology	3
HIST 320	History of Christianity	3
or RELS 320	History of Christianity	
HIST 328	War and Society in America	3
HIST 355	Global Islam	3
HIST 381	Australia & New Zealand	3
HIST 431	The North American Plains	3
HON 340	Colloquium in the Humanities	3
ID 315	History of Interiors I	3

ID 316	History of Interiors II	3
LA 321	History of Landscape Architecture	4
LANG 108	Studies in American Language and Culture	3
MUSC 100	Music Appreciation	3
MUSC 103	Introduction to Music History	3
MUSC 108	Roots of American Popular Music	3
MUSC 109	World 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
PHIL 225	Environmental Ethics	3
RELS 100	World Religions	3
RELS 220	Old Testament	3
RELS 230	New Testament	3
RELS 240	"Cults" and New Religious Movements	3
RELS 335	History of Judaism	3
RELS 345	Church and State in America	3
RELS 355	Global Islam	3
SPAN 101	First-Year Spanish I	4
SPAN 102	First-Year Spanish II	4
SPAN 201	Second-Year Spanish I	3
SPAN 202	Second-Year Spanish II	3
THEA 110	Introduction to Theatre Arts	3
THEA 115	World Film	3
THEA 160	Storytelling	3
THEA 161	Acting I	3
THEA 280	World Theatre	3
THEA 385	Period Style for Performance	3
TIPS 101	Introduction to Native American & Indigenous Studies	3
WGS 110	Introduction to Women's Studies	3
WGS 112	Introduction to Masculinities	3

CATEGORY B: Social & Behavioral Sciences - 6 Credits

Code	Title	Credits
ANTH 111	Introduction to Anthropology	3
ANSC 200	Introduction to Anthrozoology	3
ANTH 204	Archaeology and Prehistory	3
ANTH 205	Human Origins	3
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	3
ARMD 203	Sustainability and Social Change in Fashion	3
ARMD 486	Dress and Human Behavior	3
BUSN 280	Introduction To Business	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3
COMM 216	Intercultural Communication	3
DREM 101	Emergencies, Disasters, and Catastrophes	3
DREM 325	World Disasters	3
DREM 345	Understanding Vulnerable Populations in Disasters	3
ECON 105	Elements of Economics	3
ECON 201	Principles of Microeconomics	3

ECON 202	Principles of Macroeconomics	3
ENTR 201	Introduction to Entrepreneurship	3
GEOG 151	Human Geography	3
GEOG 161	World Regional Geography	3
HDFS 186	Smart Spending and Saving	3
HDFS 230	Life Span Development	3
HDFS 275	Diversity and Multiculturalism in Individual and Family Life	3
HON 341	Colloquium in the Social Sciences	3
INTL 110	Introduction to International Studies	3
MGMT 141	Travel Management	3
POLS 110	Introduction to Political Science	3
POLS 115	American Government	3
POLS 120	Terrorism	3
POLS 215	Problems and Policies In American Government	3
POLS 220	International Politics	3
POLS 225	Comparative Politics	3
POLS 231	Law and Society	3
PSYC 111	Introduction to Psychology	3
PSYC 210	Human Sexuality	3
PSYC 211	Introduction To Behavior Modification	3
PSYC 212	Psychological Aspects of Drug Use and Abuse	3
PSYC 214	Social Interaction	3
or SOC 214	Social Interaction	
PSYC 221	Psychology Applied to Work	3
PSYC 250	Developmental Psychology	3
PSYC 270	Abnormal Psychology	3
SOC 110	Introduction to Sociology	3
SOC 115	Social Problems	3
SOC 116	Global Social Problems	3
SOC 235	Cultural Diversity	3
SOC 240	Gender and Popular Culture	3
SOC 412	Sociology of Gender	3

CATEGORY W: Wellness - 2 Credits

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

Code	Title	Credits
ANSC 165	Animals and Human Health	3
ECON 205	Market Values	3
HDFS 242	Couples, Marriages and Families	3
HNES 100	Concepts of Fitness & Wellness	2
HNES 111	Wellness	3
HNES 250	Nutrition Science	3
HON 251	Leadership Development	2
HPER 217	Personal and Community Health	3
NURS 211	Perspectives for Wellness	3
PH 101	Introduction to Public Health	3
PHRM 170	Common Diseases, Prevention, and Treatment	2

CATEGORY D: Cultural Diversity

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

Code	Title	Credits
ANTH 111	Introduction to Anthropology	3
ANTH 204	Archaeology and Prehistory	3
ANTH 205	Human Origins	3
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	3
ARMD 210	Dress in World Cultures	3
ART 110	Introduction to the Visual Arts	3
BUSN 211	World Culture and Food Service	3
COMM 216	Intercultural Communication	3
DREM 345	Understanding Vulnerable Populations in Disasters	3
ENGL 150	Being Human	3
ENGL 220	Introduction to Literature	3
ENGL 261	American Literature I	3
ENGL 262	American Literature II	3
ENGL 335	Multicultural Writers	3
ENGL 340	19th Century American Fiction	3
ENGL 341	Contemporary American Fiction	3
ENGL 345	Themes in American Culture	3
ENGR 327	Ethics, Engineering, and Technology	3
or PHIL 327	Ethics, Engineering, and Technology	
FREN 101	First-Year French I	4
FREN 201	Second-Year French I	3
GERM 101	First-Year German I	4
GERM 201	Second-Year German I	3
HDFS 242	Couples, Marriages and Families	3
HDFS 275	Diversity and Multiculturalism in Individual and Family Life	3
HIST 270	American Religious History	3
or RELS 270	American Religious History	
HIST 271	Introduction to Latin American History	3
HIST 431	The North American Plains	3
LANG 108	Studies in American Language and Culture	3
MUSC 108	Roots of American Popular Music	3
PH 101	Introduction to Public Health	3
PHIL 215	Contemporary Moral Issues	3
RELS 240	"Cults" and New Religious Movements	3
SOC 235	Cultural Diversity	3
SOC 240	Gender and Popular Culture	3
SOC 412	Sociology of Gender	3
SPAN 101	First-Year Spanish I	4
SPAN 201	Second-Year Spanish I	3
THEA 115	World Film	3
THEA 280	World Theatre	3
THEA 385	Period Style for Performance	3
TIPS 101	Introduction to Native American & Indigenous Studies	3
WGS 110	Introduction to Women's Studies	3
WGS 112	Introduction to Masculinities	3

CATEGORY G: Global Perspectives

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

Code	Title	Credits
ARMD 203	Sustainability and Social Change in Fashion	3
ARCH 321	History and Theory of Architecture I	3
ART 111	Introduction to Art History	3
BIOL 124	Environmental Science	3
DREM 325	World Disasters	3
ECON 105	Elements of Economics	3
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
ECON 205	Market Values	3
ENGL 240	World Literature Masterpieces	3
ENGL 336	Literature and The Environment	3
FREN 102	First-Year French II	4
FREN 202	Second-Year French II	3
GEOG 151	Human Geography	3
GEOG 161	World Regional Geography	3
GEOL 106	The Earth Through Time	3
GEOL 201	Climate Change and Energy	3
GEOL 219	Oceanography	3
GERM 102	First-Year German II	4
GERM 202	Second-Year German II	3
GERM 220	German Culture & Society	3
HIST 175	Pirates of the Caribbean	3
HIST 320	History of Christianity	3
or RELS 320	History of Christianity	
HIST 355	Global Islam	3
HIST 381	Australia & New Zealand	3
INTL 110	Introduction to International Studies	3
MGMT 141	Travel Management	3
MICR 100	Famine, Plague, and Cheese. Microbes: the cause and solution to the world's problems	3
MUSC 109	World Music	3
NRM 225	Natural Resources & Agrosystems	3
or RNG 225	Natural Resource & Agro-Ecosystems	
PLSC 110	World Food Crops	3
PHIL 216	Business Ethics	3
PHIL 225	Environmental Ethics	3
POLS 120	Terrorism	3
POLS 220	International Politics	3
POLS 225	Comparative Politics	3
RELS 220	Old Testament	3
RELS 335	History of Judaism	3
RELS 345	Church and State in America	3
RELS 355	Global Islam	3
SOC 116	Global Social Problems	3
SPAN 102	First-Year Spanish II	4
SPAN 202	Second-Year Spanish II	3
UNIV 151	Science and Society	3
WGS 370	Transnational/Global Women	3

North Dakota University System General Education Requirements Transfer Agreement

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

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

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

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

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

Undergraduate Classification

Undergraduate Classification

Undergraduate degree-seeking students are classified according to the total number of credits earned.

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. Also, 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.

Undergraduate Non-degree Student

A student who is not seeking a degree or who has not completed the formal application process for admission is considered a non-degree students. Non-degree students may take a maximum of 15 undergraduate credits. Non-degree students are not eligible for financial aid, but academic standing will be processed at the end of each semester.

Undergraduate Degree and Graduation Information

Baccalaureate Degree and Graduation Requirements

To receive a baccalaureate (bachelor's) degree, student candidates must satisfactorily complete two sets of requirements. NDSU offers a number of baccalaureate degree types (p. 32), but the two most common bachelor's degrees awarded at NDSU are the Bachelor Science (B.S.) and the Bachelor of Arts (B.A.). Students are responsible for understanding these requirements and should consult official curriculum guides (https://www.ndsu.edu/onestop/curriculum-guides/) for all programs declared. Students should also plan to collaborate with an academic advisor to help guide them in this process.

A) University-Wide Degree Requirements

1. Minimum Total Credits: Students must present a minimum of 120 semester credits before a degree can be posted to record. Requirements for some academic programs may exceed this degree credit minimum.
2. University General Education Requirements: Students must satisfactorily complete the university's general education program requirements as outlined by the university in the general education section of the Bulletin from the year of admission or readmission to the university.
3. Minimum Scholastic Standing: Students presented for graduation must meet a minimum cumulative institutional grade-point average (GPA) of 2.00. This GPA is based on coursework taken at NDSU. Coursework transferred to NDSU is not included in this GPA calculation. Some academic programs may require a higher minimum GPA, which must be clearly outlined on the official curriculum when higher than the university minimum of 2.00 is required.

4. Resident Credit Requirement: Resident credits are earned from undergraduate courses that a student has registered and paid for at NDSU. Students must satisfactorily complete a minimum of 30 credits from courses offered at NDSU or via Tri-College registration as an NDSU student.
5. Upper Level Credit Requirements: Students must present a minimum of 36 credits in courses taken at the 300-400 level for degree completion. These credits may or may not be earned at NDSU.
6. Transfer Credits: Students presenting transfer credit must meet the NDSU residence credits as defined in #4 and the minimum upper level credit defined in #5. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.
7. Satisfy All Financial Obligations: Students must satisfy all financial obligations owed to the university. Diplomas and official transcripts will not be released to students who have outstanding debts owed to the university.
8. Application for degree**:** Candidates eligible for a baccalaureate degree or a Doctor of Pharmacy degree must complete the *Application for Graduation* found in Academic Records in Campus Connection. When eligible, students will apply for graduation from the Graduation menu within the published semester deadline (https://www.ndsu.edu/registrar/dates/). This is a hard deadline and failure to apply by the published deadline of the planned semester could delay the awarding of the degree until the following semester. Failure to satisfy all degree requirements can also delay the awarding of a degree requiring a student to have to reapply in a future semester.

B) Major Requirements for Declared Major and Minors

1. Major Requirements: In addition to the university-wide degree requirements listed above, students must complete the requirements for all declared majors and minors outlined on the official curriculum. One major will serve as the primary major; this major will determine what college will confer the degree and what, if any, college or department level requirements also apply. Refer to the curriculum guide for specific details.
   a. Declaring a major: Students must officially declare their degree and major intent. This is done:
      i. at the time of admission to the University on the application form submitted to the Office of Admission; or
      ii. at the time of readmission to the University on the *Undergraduate Reactivation/Petition for Readmission* form submitted to the Office of Registration and Records; or
      iii. by submitting a *Major Change Request* form to the Office of Registration and Records.
   b. Completing declared major: Student follow the curricula that is published in the catalog at the time they officially declare their degree and major intent described in 1.a.i-iii. Students follow the published curricula until graduation provided their enrollment at NDSU has not been discontinued for more than one calendar year (B.1.e) or a new major is declared (B.1.a.iii.).
   c. Declaring additional majors/minors: Students who wish to pursue additional majors/minors/multiple degrees/certificates must officially declare these programs to the Office of Registration and Records (B.1.a.iii).
   d. Pre-requirements majors and selective admission majors: Students enrolled in majors with pre-requirements or selective admission enrollment will have their program degree status changed from the pre-program to full-degree status based on information provided to the Office of Registration and Records by the respective academic department.
   e. Discontinue enrollment: Students who discontinue enrollment at NDSU for more than one calendar year are subject to meeting the curricular requirements published in the catalog during the term of readmission.
   f. Degree audit: Each program of study presented by a candidate for the baccalaureate degree is formally audited for meeting degree requirements by the Office of Registration and Records. Students can also view their degree progress by reviewing the academic requirements report available in Campus Connection.

Undergraduate Majors and Minors

Majors and minors are an integral part of the baccalaureate degree. Minimum credit for majors and minors is guided by Policy and Procedure 409 (https://ndusbpos.sharepoint.com/:w:/s/NDUSPoliciesandProcedures/ESMcRWeGv7tCkvL8r7aqc7MBGr1JIL_U5ES61ZgX5RF86g/?e=Lr8ZKz) from the North Dakota University System (NDUS) State Board of Higher Education (SBHE). Students are responsible for following the requirements in place at the time a major or minor is officially declared with the university. Specific major and minor curriculum requirements are available in the Undergraduate Program Curriculum (http://catalog.ndsu.edu/undergraduate/program-curriculum/) section of the catalog.

Majors

Major: An undergraduate major is a planned grouping of courses in an academic discipline, called a curriculum, to which a student formally commits to studying by declaring the major. An academic major must total a minimum of 32 semester credits and departments should actively ensure during major development that each major has a minimum of 15 unique credits from any other major offered at the University. Most majors are earned as a Bachelor of Science or a Bachelor of Arts degree, however, there are a few majors that are earned as a specialized degree. All NDSU degree types can be viewed in the Degree Types and Diploma Information (p. 32) in the catalog.

Second/Double or Multiple Majors: Students may pursue more than one major under a Bachelor of Science or a Bachelor of Arts degree. The student will identify one of majors as the primary major and this major will determine from what college the degree will be awarded. To be eligible for multiple majors, all requirements from each major curriculum must be satisfactorily completed along with other undergraduate degree requirements. ***Important Note***: When majors with different degree types are declared, the requirements for a second degree apply - see the section **Second Degree**.

Once a Bachelor of Science or a Bachelor of Arts degree is awarded, students may complete additional majors or minors under that specific degree type. Subsequent majors or minors appear as a milestone statement on the academic record following the term for which the requirements were completed.

Dual Major: A dual major is different than a second/double major or declaring multiple majors. With a dual major, two majors have been formally combined into a single curriculum. Typically, a dual major has fewer overall required classes than if a student were to declare both majors individually. Departments must request formal approval of a dual major through the governance process. Students can officially declare a dual major through the major change process. Dual majors are identified on the official major curriculum (http://catalog.ndsu.edu/undergraduate/program-curriculum/) list in the catalog.

Minors

Minor: A minor is a similar grouping of courses in an academic discipline that students may declare to enhance their undergraduate studies. A minor program of study must total a minimum of 16 credits. A minimum of eight credits for the minor must be earned in residence at NDSU. Minors are not stand alone credentials; they are awarded with a bachelor's degree.

Additional minors may be completed and recorded on a student's academic record after earning a degree. A subsequent minor will appear as a milestone statement on the academic record following the term for which the requirements were completed.

Undergraduate Certificates

Undergraduate Certificate: A certificate program is a specialized course of study requiring a minimum of 9 credits at the undergraduate level. Certificates may be earned while in pursuit of a degree or as a stand-alone program of study. Curricular requirements are available on the official major curriculum list (http://catalog.ndsu.edu/undergraduate/program-curriculum/) in the catalog.

Prospective students interested in certificate programs must make application to the University through the Office of Admission for undergraduate certificates.

Second Degree

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

1. All curriculum requirements must be satisfactorily completed.
2. Each baccalaureate degree must be different (ex. B.S. & B.A. or B.S. & B.S.E.E.). Students cannot earn more than one degree type, however, students may complete requirements for more than one major within a given degree, if available (see Second/Double or Multiple Majors).

Exceptions to Academic Program Requirements

Academic policies associated with degree requirements and graduation, transfer credit, and general education, as well as curricular requirements for programs of study are designed to ensure that programs at NDSU are consistently of high quality. Students are expected to complete all curricular requirements for a degree program, which includes:

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

However, limited exceptions may be granted under some circumstances. In consultation with an academic advisor, a student may request a course substitution or waiver to a curricular requirement. An advisor begins the process by completing and submitting the Substitution/Waiver form, which is routed to the academic department chairperson or curriculum coordinator for formal approval.

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

1. The department chairperson or curriculum coordinator may file individual substitution/waiver forms for students requiring a curricular adjustment, or
2. Move the student to a newer updated curriculum in the same major.

Bachelor of Arts Requirement Using a Second Language

The Bachelor of Arts (B.A.) degree may be conferred upon students who complete the major requirements for their chosen field of study and have functional proficiency in at least one language other than English. The B.A. degree recognizes these students as having acquired the foundation for enhancing their ability to communicate, work, and study in an internationalized world. The B.A. signifies that these students have chosen to develop, through the equivalent of at least four semesters of coursework, both practical language skills and a comparative perspective on their own language and culture. The B.A. second language requirement fosters an awareness of the culturally conditioned nature of the students' assumptions about the

world, and it better equips them with the mental agility needed to understand ways of thinking different from their own as they encounter the diversity of professional and personal relationships, as well as the intellectual and practical challenges of their future careers.

The second language requirement of the B.A. degree involves student demonstration of functional language proficiency over a sustained period of time, typically 14 credits of coursework. Given the sequential nature of language courses, the assessment of their abilities across the range of skills in speaking, reading, writing and listening comprehension is continuous and demanding. For this reason, NDSU requires that those students who have prior language-learning experience or who present language examination scores (CLEP, etc.) take, at minimum, the exit-level (202) course in order to verify their broad functional ability and basic cultural competence. It is important to note that the language requirement is not defined in credits but in terms of proficiency or communicative competence in all four skills of speaking, reading, writing and listening comprehension.

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

1. Completion in any second language of coursework at the NDSU 202 level or its equivalent with a grade of 'C' or better. Note that this requirement cannot be fulfilled by coursework taken pass/fail.
2. Successful completion of any second language course with a grade of 'C' or better that has the equivalent of NDSU 202 or higher as a prerequisite.
3. For students having previously passed the CLEP Examination (p. 48) in French, German or Spanish with a CLEP score high enough for second-year college credit (59 in French, 60 in German and 63 in Spanish) or the AP exam (p. 46) with a minimum score of 4 in French, German or Spanish, taking one additional college-level language class at the 202 level or higher in order to demonstrate competency in all four skill levels. Students must complete this course with a 'C' or better.
4. English satisfies the B.A. language requirement for students whose official, certified transcripts demonstrate that their secondary or higher education was completed in a language other than English. It is the responsibility of the student to provide all necessary untranslated, official documentation to the Department of Modern Languages (https://www.ndsu.edu/modernlanguages/) for verification. No credit will be awarded.
5. Students who are unable to provide the above mentioned certified documentation but who are native speakers of languages other than English may fulfill the second language requirement through proficiency in English by successful completion of the three-semester General Education English composition sequence and by passing an additional English (ENGL) course with a 'C' or better. Students having completed this sequence may apply to the Department of Modern Languages (https://www.ndsu.edu/modernlanguages/) for a waiver of the Second Language requirement.
6. Requests for determination of proficiency in languages not taught at NDSU are considered by the Department of Modern Languages (https://www.ndsu.edu/modernlanguages/). If a student would like to demonstrate proficiency through testing in a language that is not taught at NDSU, it is his/her responsibility to arrange for such testing. The proficiency test must be completed by a faculty or staff member at a college or university; the evaluator must hold at least a master's degree (in any discipline). The test must evaluate reading, writing, listening and speaking through the fourth semester (intermediate NDSU 202) college level. The student must provide documentation from the evaluator which includes a copy of the test, a letter from the evaluator assessing the level of proficiency, and a statement of the evaluator's credentials, including an explanation of his/her expertise in the language being tested, if the evaluator does not teach that language at the college level. No credit is awarded but proficiency requirement is fulfilled.

Graduation with Honor

Graduation with honor applies to students earning a baccalaureate degree. Candidates are eligible for graduation with honor if they have completed a minimum of 60 undergraduate resident credits at NDSU and earn a minimum institutional cumulative grade point average (CGPA) of 3.50 or higher. Transfer credit and graduate coursework are not used in the calculation of graduation with honor. Students who meet these academic criteria will graduate according to one of the following honor levels:

Honor	Criteria
Summa Cum Laude	60 undergraduate credits in residency and a CGPA equal to or greater than 3.90
Magna Cum Laude	60 undergraduate credits in residency and a CGPA equal to or greater than 3.70 and less than 3.90
Cum Laude	60 undergraduate credits in residency and a CGPA equal to or greater than 3.50 and less than 3.70

Graduation with Honor Recognition During the Commencement Ceremony

Recognition in the commencement program is based on coursework that is completed and graded at the time of the ceremony. Courses that are in progress and grades are not yet accessible online (via Campus Connection) are not included. The honor level is not announced during the reading of the student's name at the ceremony.

Official Degree Audits

A degree audit is an official review of graduation requirements by the university to determine a student's degree progress and graduation eligibility. Undergraduate students who have completed approximately 70% of their degree requirements within their primary major of study are notified by the Office of Registration and Records via their NDSU email account to submit a degree audit request form linked within this email. A Degree and Records

Analyst from Registration and Records performs a comprehensive audit and notifies both the student and the student's assigned academic advisor to locate and review the official audit results in Campus Connection.

It should be noted that degree audits are not automatically completed because student educational and degree goals vary (multiple degree, majors, minors, etc.). If the student fails to submit the official audit, graduation *could* be delayed if critical graduation requirements are missed.

Tools for students to use to continually monitor degree progress

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

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 as a degree seeking student to the university or has completed the reactivation process with the Office of Registration and Records if a returning NDSU student.

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

The Office of Registration and Records administers the NDSU policies governing the acceptance of college credit from outside institutions. These requirements apply to returning students who have attended other institutions, as well as new NDSU students. Before credits may be evaluated for specific NDSU course equivalencies or application to programs of study, transfer courses will be accepted for university credit according to the following criteria:

1. College-level coursework recognized by the United States Department of Education (https://www2.ed.gov/admins/finaid/accred/accreditation_pg3.html#RegionalInstitutional) are eligible for acceptance in transfer with receipt of official transcript or score report.
2. Course repeats
   a. Courses repeated elsewhere prior to attending NDSU will be accepted in transfer as indicated on the transferring institution's official transcript. Transfer courses taken from multiple institutions that have the same NDSU equivalent will be considered as a repeated course, and only the most recent attempted course will be accepted for transfer.
   b. Courses will not be accepted in transfer to replace any grades or credits earned at NDSU. If a course is completed at NDSU, and an attempt is made to repeat that course elsewhere, the course is considered duplicate and is not eligible for transfer. (See also Repeated Courses (p. 43) policy.)
3. Credit for a remedial course is not accepted for transfer if the course is remedial by definition of the transferring institution or if it is equivalent to a remedial course at NDSU. Remedial courses may, however, fulfill prerequisite requirements, if applicable.
4. Credit awarded by a transfer institution through examination, placement or prior learning credit will not be accepted.
5. The Office of Registration and Records determines the applicability of transfer credit toward NDSU general education requirements (p. 55) according to institutional and North Dakota University System guidelines. (See also General Education Administrative Policies (p. 58).)
6. College-level credits that do not have course equivalents at NDSU will be accepted as electives and may count only toward total credits. An academic department may determine whether these electives satisfy specific curricular requirements through the course substitution process.
7. NDSU requires that a minimum of 36 credits toward a baccalaureate degree be earned at the junior or senior (300- and 400-level) level. Therefore, while a freshman- or sophomore-level (100- or 200-level) course transferred from another institution may satisfy a specific upper-level program requirement at NDSU, that course will not be counted toward the 36-credit upper-division degree requirement.
8. Transfer grades are recorded but not computed in the institutional cumulative GPA at NDSU. Transfer grades are used only for purposes of admission to the University, admission to certain programs, and for some scholarships and financial aid.
9. All letter grades will be accepted by the university; however, many colleges and departments have standards to determine course applicability toward their respective degree programs. Transfer grades will be converted to the NDSU grading (https://catalog.ndsu.edu/academic-policies/grades/) option.
10. The name of transfer institutions and total credits accepted by NDSU will be indicated on the official transcript. Individual transfer courses are not detailed on the official transcript but are provided in the academic requirements report (https://www.ndsu.edu/onestop/academic-requirements-report/) after admission to the university.
11. Transfer credits are converted to semester credits, if applicable.

Evaluation of Transfer Credit from International Institutions

According to North Dakota University System procedure 411.5 (https://ndusbpos.sharepoint.com/:w:/s/NDUSPoliciesandProcedures/ESEpCE9aw11AhF31ewMNH-0BhqSGql3x77MepnG5VULMSw/?e=0nl6XB), international transcripts must be submitted to an approved external

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

- Students must submit official transcripts to an evaluation service that has been approved by the National Association of Credential Evaluation Services (NACES) (https://www.naces.org/members/) or the Association of International Credential Evaluators (AICE) (http://aice-eval.org/endorsed-members/).
- Official transcript(s) issued in English must be submitted to NDSU in addition to the evaluation unless the evaluation service provides certification of student documents and sends copies of transcript(s) to NDSU.
- The evaluation must contain a **course by course** evaluation.
- New international students should send evaluations directly to the Office of International Student and Study Abroad Services (https://www.ndsu.edu/admission/how_to_apply/international/transfer/).
- New domestic students or United States permanent resident students should send evaluations directly to the NDSU Office of Admission (https://www.ndsu.edu/admission/how_to_apply/transfer/requirements/).
- Students must submit course syllabi for all completed coursework directly from the international institution to the NDSU Office of Registration and Records (https://www.ndsu.edu/registrar/).
- Effective January 2020, all international transfer coursework listed as “English as a Foreign Language” will not be accepted for NDSU English Composition courses.

North Dakota University System Common Course Numbers

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

Evaluation of Military Credit

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

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

Joint Services Transcript Order Information:

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

Email: jst@doded.mil

Academic Standing

Records of all undergraduate and professional (pharmacy) students are examined at the end of each semester, including summer. Academic progress is measured by grades and credits earned. To be eligible to register continuously without restrictions, students must maintain good academic standing, which is defined as meeting or exceeding a 2.00 semester GPA on a 4.0 scale. Students are notified at the end of a semester via their NDSU email account if they become academically deficient.

Some academic majors have academic standards that are higher than the University minimum of 2.00. This information should be clearly outlined on the official major curriculum found in the University Catalog. Students may also consult with their academic adviser or academic department for information about program specific requirements. A graphic illustration of academic progress and standing is available in chart format on the Academic Standing (https://www.ndsu.edu/onestop/academic-standing/) webpage on the One Stop website.

Academic standing is defined as follows:

Good Standing

Good standing is achieved when a student's cumulative GPA is at or above 2.00. **(Prior to fall 2022, this standing was achieved when a student's semester GPA and cumulative GPA were both at or above 2.00.)**

Academic Alert

An academic alert is issued when a student who entered the grading period on good standing (or academic warning) earns both a semester and cumulative GPA below the minimum 2.00. An academic alert does not appear on the student's official academic transcript, but does appear on the unofficial transcript. Students are notified of their academic alert status via official NDSU email. **(Prior to fall 2022, this standing was Academic Probation.)**

Continued Alert

Continued alert is a formal extension of the academic alert status. It is issued when a student enters the grading period on academic alert or continued alert, shows adequate progress by attaining a minimum semester GPA of 2.00, but the cumulative GPA is still below the minimum 2.00. Continued alert does not appear on the student's official academic transcript, but does appear on the unofficial transcript. Students are notified of their continued alert status via official NDSU email. **(Prior to fall 2022, this standing was Continued Probation.)**

Academic Suspension

Academic suspension is issued when a student enters the semester on either academic alert or continued alert and earns both a semester GPA and cumulative GPA below the minimum 2.00. This includes students admitted on alert (formerly probation) for their first semester at NDSU or readmitted on alert (formerly probation) following an academic suspension. An academic suspension is a university administrative intervention, which requires a student to be disenrolled for two semesters immediately following the semester of suspension (includes summer). A **suspension hold** is placed on the student's record by the Office of Registration and Record which enrollment in these future semesters. If a student is enrolled in a future semester, this enrollment is removed to ensure that tuition and fees are refunded and there is no record activity. Students are notified of their suspension status via official NDSU email. A copy of this notification is available on the student's Campus Connection hompage in the Tasks and Communication tile. An academic suspension appears on the student's official academic transcript.

Readmission After Serving an Academic Suspension

To be considered for readmission after serving an academic suspension, a student must file a Undergraduate Reactivation/Petition for Readmission Form (https://www.ndsu.edu/onestop/student-forms/) to the Office of Registration and Records a minimum of 30 business days prior to the beginning of the semester in which the student is eligible for readmission. The petition is reviewed by a college committee and if approved, the student will be readmitted on academic probation and may register for classes.

IMPORTANT NOTE: Students who enrolled in courses at another institution while serving the terms of an NDSU academic suspension should review the NDSU repeated courses policy (https://catalog.ndsu.edu/academic-policies/repeated-courses/) and transfer credit policy (https://catalog.ndsu.edu/academic-policies/undergraduate-policies/transfer-test-credit/) (#2). Students must arrange for an official transcript to be sent to the Office of Registration and Records **before** readmission will be considered. Students re-entering NDSU from an academic suspension who attended courses elsewhere must earn a minimum cumulative GPA of 2.00 in those classes. NDSU reserves the right to revoke readmission if official transcripts are not received or the final cumulative GPA from a sending institution is below 2.00.

An Academic Suspension from Another Institution

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

Dean's List

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

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

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

Academic Forgiveness

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

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

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

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

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

***Exception**: Students who qualify for the Bachelor of University Studies general studies option (https://catalog.ndsu.edu/past-bulletin-archive/2021-22/programs-study/undergraduate/university-studies/#generalstudiesoptiontext) may apply for academic forgiveness in accordance with the above policy with one exception; rather than a 6 year absence, students in this program qualify for forgiveness after a 2 year absence.

Graduate College Policies

- General Policies (p. 74)
- Master's Degree Policies (p. 77)
- Doctoral Degree Policies (p. 81)
- Graduate Certificate Policies (p. 85)
- Graduate Assistantship Policy (p. 86)
- English Language Proficiency Procedure for Graduate Teaching Assistants (p. 88)
- Graduate Student Appeals Process (p. 89)

General Policies

Graduate students must follow all academic policies in the most recent catalog unless a policy states it applies only to undergraduate students.

Non-Discrimination Policy

NDSU does not discriminate in its programs and activities on the basis of age, color, gender expression/identity, genetic information, marital status, national origin, participation in lawful off-campus activity, physical or mental disability, pregnancy, public assistance status, race, religion, sex, sexual orientation, spousal relationship to current employee, or veteran status, as applicable. Direct inquiries to: Vice Provost, Title IX/ADA Coordinator, Old Main 201, NDSU Main Campus, Fargo, ND, 58108, 701-231- 7708, ndsu.eoaa@ndsu.edu.

This publication is available in alternate format upon request. Please contact the Graduate College at (701) 231-7033 or ndsu.grad.school@ndsu.edu.

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 special or experimental courses and are not to be included as didactic courses on a plan of study.

Change of Degree Objective

Students may change their degree objective within their graduate program. Students must meet the requirements of the new degree objective.

Students moving from a doctoral degree or Plan A master's to a Plan B or C (non-thesis) masters may use, with the approval of their advisor and graduate program coordinator, up to four (4) completed research credits toward the minimum credits for the new degree objective.

Academic Standing

The scholastic requirements below apply to each student enrolled in the Graduate College. Programs may have additional requirements. Refer to your program handbook for more information.

- A student must have a cumulative grade point average (CGPA) of at least 3.0 to be in good academic standing and to receive a graduate degree.
- All courses taken by a graduate student for which grades are given (not satisfactory/unsatisfactory) will be used in calculating the semester and CGPA.
- Grades of A, B, C or S may be used to fulfill graduation requirements.
- Earning more than two grades of C, D, F or U may be grounds for dismissal upon recommendation by the program coordinator.

Academic Warning

Any student in good standing whose CGPA drops to less than 3.0 at any time of attendance is placed on academic warning. Any student admitted in conditional status is placed on academic warning. A student on academic warning cannot register for the following semester until the grades for the current semester post.

An academic warning does not appear on the official academic transcript. Students are notified of their academic warning status via official NDSU email. These students remain eligible for graduate assistantships.

Academic Probation

If a student on academic warning fails to achieve a CGPA of at least 3.0 in the subsequent semester of attendance, they will be placed on academic probation.

A student on academic probation is not eligible for a graduate assistantship or tuition waiver. An academic probation does not appear on the student's official academic transcript. Students are notified of their academic probation status via official NDSU email.

To continue the pursuit of a graduate degree program, a student on academic probation must develop a remediation plan in collaboration with the advisor and submit the Academic Probation Remediation Plan (https://powerforms.docusign.net/bf60da25-48d5-4576-8c81-d9b5377fea07/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) form.

This plan must include:

- the specific course(s) you plan to take
- the grade you plan to earn in order to return to a CGPA of at least 3.0 within one additional semester (fall or spring) for full-time students and two semesters for part-time students (i.e. students taking 5 credits or fewer)
- explanation of the measures being taken to ensure you will receive the grades you've indicated
- signatures of the student, adviser and department chair/graduate program coordinator

The remediation form should be submitted for Graduate College approval before the first day of class the following semester. If the form is not received by the deadline, or if the goals outlined in the plan are not met in the subsequent semester(s), the student will be dismissed from the Graduate College.

Dismissal from the Graduate College

Dismissal results in the loss of active graduate student status with the Graduate College and participation in all graduate programs and course work. A dismissal is documented on the student's official academic transcript. Students are notified of their dismissal via official NDSU email.

Graduate students may be dismissed from the Graduate College as a result of:

- failure to meet our scholastic standards
- academic or professional misconduct
- insufficient progress toward a degree
- failure to meet professional expectations or standards
- failure to submit an acceptable remediation plan
- failure to meet the goals outlined in the approved remediation plan

Dismissal is confirmed following the completion of any appeal process (p. 89). Students dismissed from the Graduate College may reapply for admission after at least one calendar year from the date of their dismissal.

Enrollment Policy

Students must maintain continuous enrollment by registering for at least one graduate credit during fall and spring semester until all degree requirements are completed. If applicable, this includes the Graduate College approval of the master's paper, thesis, or dissertation.

- Registration is required for students completing the preliminary or final examinations during the summer semester.
- Students may take up to 15 credits each semester. Students wanting to exceed the credit limit must submit the Over 15 Credit Petition (https://www.ndsu.edu/gradschool/current_students/forms/#:~:text=Over%2015%20Credits%20Petition) form.
- A student who has not registered for longer than a continuous two-year period must reapply for admission and is subject to the degree requirements at the time of readmission
- For information regarding assistantships and enrollment see https://catalog.ndsu.edu/graduate/graduate-school-policies/graduate-assistantship-policy/
- In some circumstances, graduate assistants who are working 20 hours per week and registered for five or more graduate credits may be considered full-time. Check with your lender, funding provider or other organization to determine their specific requirements.

See Credit Load page (https://catalog.ndsu.edu/academic-policies/student-credit-load/) for more information.

Student visa holders, see the International Student and Study Abroad Services page (https://www.ndsu.edu/international/iss/immigration/students/credits/) for credit load information.

Coursework Completion Deadlines

- Coursework, including transfer credit, more than seven years old cannot be used to satisfy the requirements of any certificate or master's degree. Current students or students returning within the seven year timeframe may petition for an exception to this policy for NDSU coursework only. The petition for exception is limited to one extension of at most one (1) calendar year. The exception must be approved by the student's advisor, the graduate program coordinator, and the Graduate College.
- Coursework, including transfer credit, more than ten years old cannot be used to satisfy degree requirements of any doctoral degree. Current students or students returning within the ten year timeframe may petition for an exception to this policy for NDSU coursework only. The petition for exception is limited to one extension of at most two (2) calendar years. The exception must be approved by the student's advisor, the graduate program coordinator, and the Graduate College.

Master's Paper, Thesis, or Dissertation Completion Deadlines

The student will have one year from the date of the final examination to complete the Graduate College format review process and any other outstanding degree requirements.

If all degree requirements are not completed within one year the student must repeat the final examination. If a period of time two years or greater lapses before the master's paper, thesis or dissertation is approved by the Graduate College, the student must reapply to the Graduate College, redefend the disquisition and register for a minimum of two credits.

Graduate College Leave of Absence

Students may file a Request for Leave of Absence (https://powerforms.docusign.net/dfe263d9-611c-4814-a1ef-14376c97f7e8/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-%20d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) from their graduate program for up to two years. Forms must be submitted for Graduate College approval by the end of the fourth week of classes and can only be submitted if the student is not enrolled or has withdrawn to zero credits (https://www.ndsu.edu/onestop/withdrawing-classes/) (see Dates and Deadlines (https://www.ndsu.edu/onestop/dates-and-deadlines/) for details).

Filing a Request for Leave of Absence ensures that you will not need to register for semesters in which leave was approved. To re-enroll (within the two- year limit), submit the Request for Reactivation (https://powerforms.docusign.net/8e0410f1-3331-4b61-a369-85780b99e512/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7). Any approved leave of absence does not amend the seven- or ten-year coursework completion deadline.

Students who do not maintain continuous enrollment and fail to file for a leave of absence with the Graduate College must submit the Request for Reactivation (https://powerforms.docusign.net/8e0410f1-3331-4b61-a369-85780b99e512/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) form and enroll in at least one credit per missed semester (fall and spring) up to four credits.

Family and Medical Accommodation Policy for Graduate Students

The Graduate School at NDSU is committed to promoting an environment where students can successfully balance their academic and family responsibilities. The goal of this policy is to provide consistent, equitable treatment to all graduate students, regardless of family status, by providing timeline extensions for completing preliminary/qualifying examinations and by offering modified duties to students experiencing a serious health condition or needing to provide care to a new child or a seriously ill family member.

1. Extensions for Completing Preliminary/Qualifying Examinations, Final Examinations, and/or Disquisitions

Eligibility:

A graduate student is eligible to apply for a time extension on completing preliminary/qualifying examination, final examination, and/or disquisition upon showing that they are:

1. In good academic standing and making progress toward degree completion, and
2. Undergoing childbirth, caring for their newborn, caring for their child with a serious medical condition, adopting a child, accepting foster placement of a child, experiencing their own serious medical condition, or experiencing a serious medical condition of a spouse/partner or parent for which they have caretaker responsibilities (medical certification may be required).

Length of Extensions:

While each extension granted under this policy will be assessed on a case-by-case basis, absent extraordinary circumstances, the additional time granted by this policy will not exceed two years.

A graduate student undergoing childbirth, adopting a child, or accepting foster placement of a child shall be entitled to receive an extension of up to one extra year for completing preliminary/qualifying examination, final examination, and/or submitting a disquisition.

A graduate student experiencing their own serious medical condition, caring for their child with a serious medical condition, or experiencing a serious medical condition of a spouse/partner or parent for which they have caretaker responsibilities shall be entitled to receive an extension of up to six extra months for completing a preliminary/qualifying examination, a final examination, and/or submitting a disquisition.

Application/Approval Process:

Graduate students who wish to obtain an extension under this policy must document their eligibility in writing to their academic unit prior to the effective date of the extension – retroactive requests will not be considered, absent extraordinary circumstances. The student's academic unit and the Graduate School will then assess the student's eligibility and approve/deny the extension. Additionally, international students on a visa must have their extension approved by the Office of International Student and Study Abroad Services.

Leave of Absence

Students requesting an extension may also choose to take a leave of absence from their graduate program. International students will need to consult with the Office of International Student and Study Abroad Services to determine if they are eligible for a leave of absence.

2. Modified Duties for Graduate Assistants

Eligibility:

A graduate assistant is eligible for "modified duties" if the graduate assistant:

1. Becomes a parent through childbirth, adoption, or foster placement of a child;
2. Has a health condition that makes him or her unable to perform regular duties but does not necessitate a reduction in workload; or
3. Will be caring for a child, spouse/partner or parent who has a serious health condition.
4. Must have served as a graduate assistant for at least one academic term.

Definition and Length of Modified Duties:

"Modified duties" means a change to duties and goals without reduction of stipend for a limited period of time. A graduate assistant taking modified duties will still be at a 100% workload and 100% stipend; however, the nature of the responsibilities for this time period will be adjusted. Modified duties will include a revision of workload for up to the equivalent of a semester. If warranted and supported by appropriate medical documentation, graduate students can be excused from most, if not all, of their regular duties for up to six weeks without a reduction in pay. All eligible students will be granted a Parental Accommodation period for up to six weeks immediately following the birth of a child or the adoption of a child under the age of 6 for which the student has parental responsibilities. (Additional time may be granted based on medical documentation of exceptional medical circumstances experienced by the student or his/her child, spouse, partner, or dependent parent.)

Regardless of circumstances, modified duties agreements must conclude within 12 months.

Application/Approval Process

A graduate assistant requesting modified duties shall document their request in writing to their supervisor and department chair/head. The graduate assistant and the department will engage in an interactive process to determine how the graduate assistant's duties will be modified and the duration of the modified duties. In the event that an agreement cannot be reached between the graduate assistant and the department, the Dean of the Graduate School shall assist in reaching an agreement. To ensure that all parties are operating under the same understanding, the agreement for modified duties shall be put in writing. Graduate assistants accepting modified duties are subject to the regular evaluation procedures used in the program; however, such evaluations shall be based on the agreed upon modified duties.

Master's Degree Policies

Degrees Offered

North Dakota State University (NDSU) offers Master of Arts (M.A.), Master of Science (M.S.), and non-thesis master's programs.

M.A. and M.S. students may opt for a Plan A (Thesis) or Plan B (Master's Paper/Comprehensive Study) program. The Plan C (Culminating Experience) option is primarily intended for non-thesis degree programs; however, some M.S. programs do offer the Plan C option. Not all programs offer all three options. In addition, plans may differ in the composition of the student's supervisory committee and required submissions to the Graduate College for degree completion.

Master of Arts/Master of Science Overview

Plan A: Thesis-based Master's

The thesis typically includes a problem statement, a review of existing literature relevant to that problem, and the creation and presentation of new knowledge in providing a solution to the problem. Each student assembles a supervisory committee, as described on the next tab, and is required to pass a final oral examination in which the supervisory committee serves as the examining committee. Following a successful final examination, the student will submit an electronic copy of their thesis to the Graduate College for format review.

Plan B: Master's Paper/Comprehensive Study-based Master's

The student will develop a thorough understanding of existing knowledge and the ability to apply that existing knowledge to a problem of interest. The individual creative component is defined by the program and could include a portfolio or integrated field experience.

Each student is required to pass a final oral examination in which the supervisory committee serves as the examining committee. Following a successful final examination, the student will submit an electronic copy of their master's paper to the Graduate College for format review.

Plan C: Culminating Experience-based Master's

The Plan C option allows each academic program to define a culminating experience such as a capstone course, a written examination, or some other approach to measure the student's understanding of the relevant material in the discipline.

Non-Thesis Master's Programs (Discipline-specific or course-based master's programs)

Master of Accountancy (M.Acc.)

Master of Athletic Training (M.A.Trg.)

Master of Business Administration (M.B.A.)

Master of Construction Management (M.C.M.)

Master of Education (M.Ed.)

Master of Engineering (M.Engr.)

Master of Music (M.M.)

Master of Natural Resources Management (M.N.R.M.)

Master of Public Health (M.P.H.)

Master of Public Policy (M.P.P.)

Master of Software Engineering (M.S.E.)

Master of Supply Chain Management (M.S.C.M.)

Education Specialist (Ed.S.) in Educational Administration

Supervisory Committee

Some Plan C programs do not require a Supervisory Committee. Refer to Plan C specifics below.

The Supervisory Committee is comprised of the student's advisor (committee chair) and supporting committee members. The major adviser-student relationship must be a mutually acceptable one. The goal in selecting a supervisory committee is creating a team to help the student develop a Plan of Study to align with the student's desired professional goals, provide support in the growth of the student as a professional, and oversee the student's final project or final examination.

Students may not bring food or beverages for the committee members to Supervisory Committee meetings, preliminary examinations, or final examinations. If a program wishes to provide refreshments at these meetings, it is the responsibility of the program to pay for and obtain them.

The supervisory committee members should be identified before the Plan of Study is formulated so that all committee members have a chance to contribute. The supervisory committee, agreed upon by the major advisor and student, is approved by the graduate program coordinator at the time the Plan of Study is submitted.

To add an external member (not full or affiliate graduate faculty) to a graduate committee, the Plan of Study or Supervisory Committee Change form (if the Plan of Study is already filed) must include a letter of support from the department chair and a copy of the external member's curriculum vitae (CV). The chair's letter should indicate the chair and department's support for this person to be on the committee and list the expertise this person brings to the committee. There is a paperclip icon on both forms that allows the student, advisor and graduate program coordinator to add the letter and CV.

- The letter must come from the department chair only, not the advisor. An advisor may add a letter of support, though this letter alone is not sufficient.
- The external member cannot be an affiliate graduate faculty member of the advisor's home department/program.

Plan A and Plan B

The supervisory committee will have at least three members. The members consist of:

- The major advisor, who must be a full or affiliate member of the graduate faculty Level 1 or Level 2, will be the committee chair.
- A second member, who must be a full or affiliate member of the graduate faculty. The second member may serve as co-adviser on the supervisory committee. The co-chair designation implies equally shared responsibilities in guiding the student through to degree completion.
- A third member, who could be either a full member of the graduate faculty from outside the advisor's home department or a qualified off-campus expert in the field.

Plan C

The student's advisor must be a full or affiliate member of the graduate faculty. If the program does require students in this option to form a supervisory committee, all members must be a full or affiliate member of the graduate faculty.

Advisor or Supervisory Committee Changes

Advisor changes and changes to the supervisory committee may be made with the Request to Form or Change Supervisory Committee (https://powerforms.docusign.net/1c3281c5-f567-4702-8620-3d62724d1518/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) form. The student, advisor, graduate program coordinator, and the Graduate College must approve changes.

Plan of Study

Some programs do not require a Plan of Study to be filed with the Graduate College. Refer to your program handbook for more information.

The Plan of Study is an agreement between the student, the academic program, and the Graduate College that specifies all courses required to earn the graduate degree. This includes any qualifying transfer credits (see transfer credit policy below) and up to 10 credits taken as a non-degree NDSU graduate student toward the degree.

A master's degree includes both didactic credits and non-didactic credits. Didactic credits are numbered 601-689, 691; 700-789, 791; 800-889 and 891. Non-didactic credits are numbered 690, 692-699; 790, 792-799; 890, 892-899. The 600 number range indicates a combined undergraduate/graduate course and 700 and 800 are masters and doctoral level courses. Courses that a student has used to fulfill the requirements of a baccalaureate degree may not be used on that student's graduate plan of study, unless taken as part of an accelerated degree program.

Each program is responsible for defining the requirements for a major in its disciplinary area and making this information available to students. Each student is responsible for familiarizing themselves with the requirements, rules, and recommendations.

The Graduate College allows credits taken as part of a certificate to be used towards the requirements for a master's degree. Programs may restrict the usage of these credits on the master's Plan of Study. Reference your program's handbook for more information.

The Plan of Study must be approved by the student, the supervisory committee, the graduate program coordinator, and the Graduate College and must be filed with the Graduate College by the end of the student's second semester of study.

Plan A Master's Degree

- Minimum 30 credits total
- 16 of the 30 must be didactic credits
- 6-10 credits of 798 Master's Thesis

Plan B Master's Degree

- Minimum 30 credits total
- 21 of the 30 must be didactic credits
- 2-4 credits of 797 Master's Paper

Plan C Master's Degree

- Minimum 30 credits total

Course Deletions or Substitutions

Course deletions or substitutions may be made with the Change to Plan of Study (https://powerforms.docusign.net/20c075c4-741c-4c43-8767-4c48338ddfaf/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) form. The student, advisor, graduate program coordinator, and the Graduate College must approve changes.

Transfer of Credit

Transfer of credit is requested at the time a Plan of Study or Change to Plan of Study is filed in the Graduate College. A maximum of 10 credits of graduate-level course work from regionally accredited colleges or universities (or equivalent for international institutions) may be eligible to be used in completing the student's degree program.

Transfer credit coursework must:

- meet degree program requirements
- be graduate level
- be verified by an official transcript from the transfer institution with grades posted
  - Transcript(s) must be filed in the Graduate College at the time the transfer of credit is requested
- not have been used to fulfill the requirements of a baccalaureate degree
- carry only grades of A or B on a 4.0 scale
  - Pass/Fail or Satisfactory/Unsatisfactory graded courses are not eligible for transfer
- not be a continuing education, correspondence, extension education, or workshop course
- not be internship, individual study, special topics, or research course
- have been earned within a 7-year period at the time of the student's final defense (Plan A/B options) or at the end of the student's last semester of coursework (Plan C option/non-thesis degree programs)

Departments and programs have the right to further restrict or eliminate acceptance of transfer credits for their degree programs. Prospective students are encouraged to contact the respective academic department or the Graduate College with transfer credit questions.

Concurrent Master's Degrees

A student may be allowed to work at satisfying the requirements of two graduate degrees concurrently. A maximum of 10 graduate credits of course work can be applied to both programs of study as approved by all members of both supervisory committees, the two program administrators, and the Graduate College. A student pursuing multiple graduate degrees must

- Apply and be accepted to both degree programs
- File a plan of study for each program
- Complete all academic program requirements
- Complete all Graduate College requirements
- Maintain continuous enrollment in each program
- Successfully complete the master's thesis, paper, or culminating experience for each degree program
  - If each program requires a master's paper, thesis, or culminating work, they must differ substantially and must result from substantial work completed independently in each discipline.
- Successfully complete any final examination as required for each program

Master's Degree with Two Major Areas

A student may pursue one master's degree with two major areas. Such a program must have the concurrent recommendation of the administrators of the two programs. The Plan of Study shall clearly delineate the course work required for each major area.

- A minimum of 40 credit hours is required, including at least 14 graduate course credits in each of the two major areas.
- No more than 10 of the required 40 credits shall be research credits under the Plan A masters, while no more than four of the required 40 credits shall be paper credits under the Plan B master's.
- The student is required to conduct interdisciplinary scholarly work culminating in one master's paper or thesis acceptable in both major areas.

Final Defense

The following policies do not apply to Plan C option students. Refer to your program handbook for more information on procedures.

The final defense is an oral examination given to the supervisory committee in which the author of the master's paper, thesis, or culminating work demonstrates satisfactory command of both the focus area of their project and the broader field.

Notification of Scheduled Examination

At least seven (7) calendar days prior to the final defense date, the Notification of Scheduled Examination form must be approved by the student's advisor and graduate program coordinator and filed with the Graduate College.

- A *successful* submission requires all signatures, not only that the graduate student has initiated the form.
- If the form is not filed seven (7) calendar days prior, it will not be approved by the Graduate College.
- A final defense takes place without an approved notification form is considered void. A new defense date must be scheduled and the Notification of Scheduled Examination (https://powerforms.docusign.net/0abb6387-c124-45e6-bc80-337a7635ffb0/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) filed seven days prior to the new date.

Pre-defense Document Distribution

The master's paper, thesis, or other culminating work must be distributed to the committee members for review at least seven (7) calendar days prior to the defense.

- If this seven (7) day stipulation cannot be met, the student's committee holds the right to cancel the final defense. It is the student's responsibility to notify the Graduate College if their defense does not take place as scheduled and to complete a new Notification of Scheduled Examination.

Defense Attendee Policy

- If one supervisory committee member cannot participate in the final defense, the defense may be held; however, their absence is considered a "Disapproval" of the student's defense.
- If more than one supervisory committee member cannot participate in the final defense, the defense must be rescheduled.
- It is the student's responsibility to notify the Graduate College if their defense does not take place as scheduled and to complete a new Notification of Scheduled Examination.

Final Defense Outcomes

It is the student's responsibility to initiate the Report of Final Defense (https://www.ndsu.edu/gradschool/current_students/forms/#:~:text=Report%20of%20Final%20Defense), ensure all committee members sign it, and submit it to the Graduate College within 14 calendar days following the defense.

- A *successful* submission requires all signatures, not only that the graduate student has submitted the form.
- If the form is not submitted within 14 calendar days, the defense is considered void and must be rescheduled.

The student must pass a final defense as part of earning the master's degree.

- A negative vote by two or more members of the student's committee will signify failure of the defense.
- The student may repeat the defense only upon permission from a majority of the supervisory committee. The committee will set a date at least one month after the failed defense and a new Notification of Scheduled Examination must be submitted within the seven (7) day deadline.
  - 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 defense be failed twice, the student cannot continue in their graduate program.
  - The student will not be given a third defense except by recommendation of the examining committee, program coordinator, and special approval of the Dean of the Graduate College following consultation with the Graduate Council.

Doctoral Degree Policies

Degrees Offered

Doctor of Philosophy (Ph.D.)

Doctor of Education (Ed.D.)

Doctor of Musical Arts (D.M.A.)

Doctor of Nursing Practice (D.N.P.)

Didactic Credit-Based Doctoral Degrees

In didactic-credit based doctoral programs, students gain knowledge through coursework of which the majority are didactic. Didactic courses are numbered 601-689, 691; 700-789, 791; 800-889 and 891.

Outcomes-Based Doctoral Degrees

Students in outcomes-based doctoral programs must meet Graduate Council and program specific outcomes through credit-based academic activity. There are no didactic credit requirements for these programs, though 90 credits post-baccalaureate degree must be earned.

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.

Supervisory Committee

The supervisory committee is comprised of the student's advisor (committee chair) and supporting committee members. The goal in selecting a supervisory committee is creating a team to help the student develop a Plan of Study to align with the student's desired professional goals, provide support in the growth of the student as a professional, and oversee the student's preliminary examination and final defense and dissertation completion.

Students may not bring food or beverages for the committee members to supervisory committee meetings, preliminary examinations, or final examinations. If a program wishes to provide refreshments at these meetings, it is the responsibility of the program to pay for and obtain them.

The supervisory committee members should be identified before the plan of study is formulated so that all committee members have a chance to contribute. The supervisory committee, agreed upon by the major advisor and student, is approved by the graduate program coordinator at the time the Plan of Study is submitted.

To add an external member (not full or affiliate graduate faculty) to a graduate committee, the Plan of Study or Supervisory Committee change form (if the Plan of Study is already filed) must include a letter of support from the department chair and a copy of the external member's curriculum vitae (CV). The chair's letter should indicate the chair and department's support for this person to be on the committee and list the expertise this person brings to the committee. There is a paperclip icon on both forms that allows the student, advisor and graduate program coordinator to add the letter and CV.

- The letter must come from the department chair only, not the advisor. An advisor may add a letter of support, though this letter alone is not sufficient.
- The external member cannot be an affiliate graduate faculty member of the advisor's home department/program.
- For doctoral students, the external member (Graduate School Representative) must be a full member of the graduate faculty. An affiliate graduate faculty or non-tenured or tenure-track faculty member cannot serve in this role. If a previously approved GSR has left NDSU, a new GSR must be found and a supervisory committee change form be filed with the Graduate School

The supervisory committee will have at least four members. The members consist of:

- The major advisor, who must be a full or affiliate member of the graduate faculty Level 1, will be the committee chair. The major advisor-student relationship must be a mutually acceptable one.
- A second member, who must be a full or affiliate member of the graduate faculty. The second member may serve as co-advisor on the supervisory committee. The co-chair designation implies equally shared responsibilities in guiding the student through to degree completion.
- A third member, who could be either a full or affiliate member of the graduate faculty, affiliate member of the graduate faculty, or a qualified off-campus expert in the field.
- The Graduate School Representative (GSR), chosen by the student in consultation with the committee chair ensures
  - Graduate College policies are followed,
  - expectations for the student's performance are reasonable,
  - interactions with the supervisory committee are conducted on a professional basis.
  - the process and assessment of the student's performance is documented and, for outcomes-based doctoral programs, matches the outcomes defined

GSR Eligibility Requirements

The GSR must be a full member of the graduate faculty and

- be either a tenured faculty member outside the committee chair's/co-chairs home department(s) OR a faculty member outside the primary college of the committee chair/co-chairs
- be clear of any conflicts of interest with either the student or the committee chair/co-chairs. Examples of possible conflicts of interest may include budgetary or financial relationships, family or personal relationships, or research and/or publication relationships.

If the student is in an interdisciplinary program, the GSR must also not be listed as a faculty member on that program's catalog page.

Advisor or Supervisory Committee Changes

Advisor changes and changes to the supervisory committee may be made with the Supervisory Committee Change (https://www.ndsu.edu/gradschool/current_students/forms/#:~:text=Change%20Supervisory%20Committee) form. The student, advisor, graduate program coordinator, and the Graduate College must approve changes.

Plan of Study

Some programs do not require a Plan of Study to be filed with the Graduate College. Refer to your program handbook for more information.

The Plan of Study is an agreement between the student, the academic program, and the Graduate College that specifies all courses required to earn the graduate degree. This includes :

- any qualifying transfer credits (see transfer credit policy below)
- up to 10 credits taken as a non-degree NDSU graduate student toward the degree
- any previously earned master's degree if being used toward the total 90 credits

The Plan of Study must be approved by the student, the supervisory committee, the graduate program coordinator, and the Dean of the Graduate College and must be filed with the Graduate College by the end of the student's second semester of study and at least one month prior to scheduling the comprehensive/preliminary examination.

NDSU has minimum requirements for degrees, which are outlined below. Students in outcomes-based programs must complete the minimum number of credits for the degree. Each program is responsible for defining the requirements for a major in its disciplinary area and making this information available to students. Each student is responsible for familiarizing themselves with the requirements, rules, and recommendations.

Bachelor's to Doctoral Degree

- Minimum of 90 graduate credits total; minimum of 86 graduate credits for the DNP
- 27 credits must be from didactic courses
  - 15 of which must be 700 or 800 level course work
  - No more than 15 didactic credits may be transferred as part of the Plan of Study
  - Didactic credits requirements do not apply to outcomes-based programs.
- Specific programs may require completion of additional credits

Master's to Doctoral Degree

- Minimum of 90 graduate credits total; minimum of 86 graduate credits for the DNP
  - Thirty credits from a previously earned master's degree may be approved to fulfill 30 of the 90 doctoral program credits required. The previous master's degree must be meaningfully related to the discipline in which a doctoral degree is pursued.
  - Up to 15 transfer credits from another doctoral program in the same or a meaningfully related discipline from an accredited doctoral institution may be allowed in individual cases.
  - Minimum of 45 credits total completed at NDSU
- 15 credits must be 700-800 level didactic courses
  - Didactic credits requirements do not apply to outcomes-based programs.
- Specific programs may require completion of additional credits

Course Deletions or Substitutions

Course deletions or substitutions may be made with the Change to Plan of Study (https://powerforms.docusign.net/20c075c4-741c-4c43-8767-4c48338ddfaf/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) form. The student, advisor, graduate program coordinator, and the Dean of the Graduate College must approve changes.

Transfer of Credit

NDSU graduate –level course work is not considered transfer credit, even if those credits were taken while in a different graduate program.

Transfer of credit is requested at the time a Plan of Study or Change to Plan of Study is filed in the Graduate College. A maximum of 15 credits of graduate-level course work from regionally accredited colleges or universities (or equivalent for international institutions) may be eligible to be used in completing the student's degree program.

Transfer credit coursework must:

- meet degree program requirements
- be graduate level
- be verified by an official transcript from the transfer institution with grades posted
  - Transcript(s) must be filed in the Graduate College at the time the transfer of credit is requested
- must not have been used to fulfill the requirements of a baccalaureate degree
- carry only grades of A or B on a 4.0 scale
  - Pass/Fail or Satisfactory/Unsatisfactory graded courses are not eligible for transfer
- not be a continuing education, correspondence, extension education, or workshop course
- not be internship, individual study, special topics, or research courses
- have been earned within a 10-year period at the time of the student's final defense

Departments and programs have the right to further or eliminate acceptance of transfer credits for their degree programs. Prospective students are encouraged to contact the respective academic department or the Graduate College with transfer credit questions.

Examinations

A **preliminary examination** consists of a written portion and an oral portion. Passing the preliminary examination allows the student to be formally admitted to candidacy for the doctoral degree.

- The Plan of Study must be approved at least 30 calendar days prior to scheduling the oral portion.
- A student may not attempt the final defense in the same semester in which they complete the the preliminary examination.

The **final defense** is an oral examination in which the author of the dissertation demonstrates to the supervisory committee a satisfactory command of both the focus area of their project and the broader field.

Notification and Report

The Notification of Scheduled Examination (https://powerforms.docusign.net/0abb6387-c124-45e6-bc80-337a7635ffb0/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) form is required for the oral portion of the preliminary examination and for the final defense. This form must be submitted to the Graduate College at least seven (7) calendar days prior to the examination date.

- A *successful* submission requires all signatures, not only that the graduate student has initiated the form.
- If the form is not filed seven (7) calendar days prior, it will not be approved by the Graduate College.
- An oral preliminary examination or final defense takes place without an approved notification form is considered void. A new examination or defense date must be scheduled and the Notification of Scheduled Examination (https://powerforms.docusign.net/0abb6387-c124-45e6-bc80-337a7635ffb0/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) filed seven days prior to the new date.

Pre-defense Document Distribution (Final Defense only)

The dissertation work must be distributed to the committee members for review at least seven (7) calendar days prior to the defense.

- If this seven-day stipulation cannot be met, the student's committee holds the right to cancel the defense. It is the student's responsibility to notify the Graduate College if their defense does not take place as scheduled and to complete a new Notification of Scheduled Examination.

Examination Attendee Policy

- Due to the role of the GSR, they are required to attend each examination.
- If another supervisory committee member cannot participate in an examination, the defense may be held; however, their absence is considered a "Disapproval" of the student's examination.
  - If more than one supervisory committee member cannot participate in an examination, the defense must be rescheduled.
- It is the student's responsibility to notify the Graduate College if their examination does not take place as scheduled and to complete a new Notification of Scheduled Examination.

Outcomes

It is the student's responsibility to initiate the appropriate report (https://www.ndsu.edu/gradschool/current_students/forms/#:~:text=Examination%20and%20Degree%20Completion), ensure it is signed by all committee members, and submit it to the Graduate College within 14 calendar days following the defense.

- A *successful* submission requires all signatures, not only that the graduate student has initiated the form.
- If the completed form is not submitted within 14 calendar days following the examination, the examination is considered void and must be rescheduled.

The student must pass each examination as part of earning the doctoral degree.

- A negative vote by two or more members of the student's committee will signify failure of the defense.
- 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 and a new Notification of Scheduled Examination must be submitted 14 calendar days prior to the defense date. 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 cannot continue in their graduate program.
  - The student will not be given a third examination except by recommendation of the examining committee, program coordinator, and special approval of the Dean of the Graduate College following consultation with the Graduate Council.

Filing the Dissertation

After the final defense, the student incorporates all revisions into the dissertation as required by the supervisory committee. Once a student makes the corrections, submit the following items to the Graduate College:

- signed approval page
- IRB/IACUC/IBC Compliance Notification
- dissertation
- dissertation processing fee

The student will have one (1) year from the date of the final defense to complete the Graduate College dissertation format review process and all other degree requirements. Should the dissertation not receive final approval or any other degree requirements not be completed within this time limit, the student must repeat the final defense. 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 defense, and register for a minimum of two (2) credits.

A degree posts at the end of the semester in which the dissertation is approved and other degree requirements are completed.

Graduate Certificate Policies

Graduate certificate programs at NDSU provide focused course experiences in a set curriculum that build a distinct skill set. Certificates may be completed independently or as part of a master's degree program. Only graduate credits earned at NDSU may be applied to a certificate program.

Students in a certificate program, (who are not also in a degree-seeking program) are not eligible to receive federal Title IV student financial assistance, graduate assistantships or tuition waivers.

Certificate Completion

- Certificate students must meet the same academic standing requirements as degree seeking students.
- Course substitutions may be made with the Change to Plan of Study. The student, advisor, graduate program coordinator, and the Graduate College must approve changes.
- Courses used to satisfy the Graduate Certificate program requirements cannot be older than seven (7) years at the time the certificate completion is verified.
- Candidates must submit a Graduation Application by the last day of the term in which certificate requirements are completed. The certificate will not post to the student's record if the graduation application is not submitted.
- Credits earned toward completion of a certificate also may be used toward the completion of a graduate degree, if allowed by the degree program.

Course Substitutions

Course substitutions may be made with the Change to Plan of Study. The student, advisor, graduate program coordinator, and the Graduate College must approve changes.

Graduate Assistantship and Fellowship Policies

A graduate#assistantship provides financial support for pursuing graduate studies in the form of employment. In return for#contribution#to the academic mission of North Dakota State University through#teaching, research, or administrative service, students receive a stipend, and if requirements are met, a waiver of graduate base tuition may be granted at the discretion of the graduate program's academic college. A graduate assistantship may involve research or teaching experiences conducted off-campus. In these instances, the experience should be clearly linked to the student's Plan of Study and involve a collaborative relationship between NDSU and the outside entity.

Students with Graduate Fellowships who are contracted to work in NDSU laboratories and/or classrooms must adhere to Graduate Assistant Policies.

To be eligible for an assistantship students must

- Be a degree seeking students
- Be in good academic standing
- Be enrolled in a minimum of 6 graduate credits during the fall and spring semester
  - This policy does not apply if the student has fewer than 6 credits remaining to complete their program of study.
  - Departments may require students to register for more than 6 credits to hold an assistantship
  - Students seeking a summer assistantship must be enrolled for a minimum of 6 credits either during the spring prior or fall term immediately after the summer fellowship; summer enrollment is not required for a summer term assistantship.

Assistantship appointments may vary in length and are contingent upon the availability of funding, which is determined by individual graduate programs. Graduate assistants must be paid at least minimum wage and wage is determined by individual graduate programs. For information, refer to the graduate student handbook or website of the program/department.

A full-time assistantship consists of 320 hours per term (i.e. 20 hours/week).#Exceptions may include:

- Allowing up to 40 hours of work weekly during spring break, winter break, and summer semester.
- Allowing up to 26 total hours/week.
  - To make this request, a Special Request form must be filed each spring and fall semester to add additional hours to a full-time domestic or permanent resident student's assistantship.
  - If approved by the Graduate College, a copy of the request must be attached to the payroll form.

In some instances, degree seeking students in good academic standing and meeting the enrollment requirement of six credits during the fall or spring semester may be eligible for a half- or part-time graduate assistantship. A minimum of 160 hours per semester (i.e. 10 hours/week) are required to qualify for a half- or part-time assistantship.

Assistantship Categories

Graduate Research Assistants (GRA) conduct research with faculty members that contributes directly to their graduate education and may lead to a dissertation or thesis topic. GRAs responsible for, or with access to, controlled substances and other drugs, explosives, or potentially dangerous chemicals must submit to a criminal background check. 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.

Graduate Teaching Assistants (GTA) share faculty responsibilities for undergraduate teaching but cannot teach graduate level courses. Responsibilities may include instruction, grading, course development, and proctoring exams. GTAs must demonstrate English proficiency (refer to catalog section titled "English Language Proficiency Procedures for Graduate Teaching Assistants").#A criminal background check is required.

Graduate Service Assistants (GSA) provide non-academic support for departments and campus services. Duties may vary between departments and positions. A criminal background check is required.

Additional Employment

Students with a full-time assistantship are discouraged from having additional off-campus employment.

Further, students with a#full-time#assistantship are restricted from working in any other capacity for NDSU, any other North Dakota University System (NDUS) campus, or any State of North Dakota agency or office.

Expectations of Graduate Assistant/Fellow

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#assistantship#and/or termination from the Graduate College. Adjudication of these violations will occur using NDSU Policy 335: Code of Academic Responsibility and Conduct

Graduate assistants must

- be registered#for a minimum of six graduate credits each semester (fall and spring) they receive an#assistantship; credit requirements may vary by program
- remain in good academic standing
  - Students placed on Academic Warning may retain their assistantship
  - Students placed on Academic Probation may no longer receive an assistantship
- maintain the appropriate residency status
- abide by the appointment conditions outlined in the assistantship contract
- perform tasks as assigned
- make satisfactory degree progress
- make satisfactory research progress
- complete#required trainings#within#30 days#of their first day of work and#as required thereafter

Expectations of Assistantship Supervisor

Assistantship and Fellowship contracts

The Graduate#Contract specifies expectations and responsibilities of the graduate assistant or fellow.

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.

Assessment

Assistantship supervisors must provide oral and written assessment of graduate student employees. As outlined in the contract, GSA and GRA performance must be evaluated at least annually. GTA review with respect to overall communication proficiency must be completed by the third week of the semester.

Tuition Waivers

Tuition waivers may be offered to students receiving a qualifying graduate assistantship or fellowship and are governed by the specific tuition waiver policies of the granting academic college.

Qualifying graduate assistantships must be a minimum of 10 hours a week and may not exceed 20 hours a week (see previous page) and must total a minimum of 160 hours during spring and fall semesters.

- 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.
- Partial tuition waivers are not given if the student works fewer than the minimum hours (160) required per semester.

Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

- The tuition waiver may be reduced by other financial awards directed specifically to pay tuition.
- Students receiving a graduate tuition waiver may not receive other NDSU tuition waivers. Student eligible for multiple tuition waivers will receive the waiver resulting in the most tuition being waived.

Tuition waivers are applied to student accounts following completion of required trainings.

Eligibility for a summer tuition waiver is dependent upon the specific tuition waiver policies of the granting college which may include holding a summer assistantship or having received a tuition waiver for the preceding or following academic term (spring or fall semester).

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 *University Catalog*, 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.

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 program 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 14 calendar days of notification of the mediation results (refer to section titled "Graduate Student Appeals").

English Language Proficiency for Graduate Teaching Assistants

Graduate Teaching Assistants (GTAs) must meet requirements listed in the “English Language Test Score Minimum Requirements” chart below. GTAs may be grader-only or in-class teaching assistants. In-class teaching assistants are involved in lectures, labs, or tutoring. Grader-only assistants have no direct contact with students and may serve one calendar year before completing one of the following requirements:

- Meeting the English Language Test score minimums listed below for in-class assistants
- Satisfactorily completing LANG 701 English Language and Classroom Skills for International GTAs as well as
  - a co-requisite graduate-level oral skills course (LANG 606 Oral English Language Strategies and Skills for Presentation, LANG 702 English Language Tutorial for International GTAs or LANG 704 Language Strategies For Literature Reviews), and
  - a Mock Teaching Exam designed in coordination with their department to qualify to be an in-class teaching assistant at NDSU.

Test Score Requirements

Total Score

	Grader	Teaching Assistant
ibT	79	81
IELTS	6.5	7
PTE Academic	53	54
Duolingo	110	115

Speaking

	Grader	Teaching Assistant
ibT	19	23
IELTS	5.5	6.0
PTE Academic	51	62

Writing

	Grader	Teaching Assistant
ibT	21	21
IELTS	6.0	6.0
PTE Academic	56	56

Evaluation of Graduate Teaching Assistants

All in-class GTA are evaluated during the third week of the first semester of their appointment. 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 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.

Graduate Student Appeals

Overview

The Graduate College at North Dakota State University encourages resolution of problems at the level most closely related to the origin of the specific disputes. Students may seek advice regarding their situation from a neutral party, such as the University Ombudsperson (https://www.ndsu.edu/ombud/). Though this may be done at any point, it might be most helpful early in the process.

In order to resolve an issue, the following steps should be taken:

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 as the procedure varies depending on the specific nature of the problem.

Areas of possible graduate student appeal include equal opportunity, dismissal from an academic program or the Graduate College, sanctions for academic dishonesty, and degree-acquisition processes that are unique to graduate education. The appropriate procedures/offices for these types of appeals are outlined below. The burden of proof by a preponderance of the evidence is on the graduate student making the appeal.

Equal Opportunity

North Dakota State University's general and specific commitment (https://www.ndsu.edu/equity/statement_from_the_president/) to being an equal opportunity institution is expressed elsewhere in this bulletin. In short, NDSU prohibits discrimination and harassment on the basis of age, color, gender expression/identity, genetic information, marital status, national origin, physical or mental disability, pregnancy, public assistance status, race, religion, sex, sexual orientation, spousal relationship to current employee, 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. Title IX specifically prohibits discrimination based on sex in education programs or activities, including, but not limited to, gender-based discrimination, pregnancy discrimination, sexual harassment, or sexual assault. NDSU also prohibits retaliation based on protected activity, including, but not limited to, reporting alleged discrimination, or providing information during a discrimination investigation.

Inquiries concerning compliance with NDSU Equal Opportunity policy may be directed to the Vice Provost and Title IX Coordinator (201 Old Main, 701-231-7708, ndsu.eoaa@ndsu.edu) or to the Office for Civil Rights, U.S. Department of Education, 10220 N. Executive Hills Blvd., 8th Floor, 07-6010, Kansas City, MO 64153-1367.

Academic Evaluation

The University Senate Grade Appeals Board (https://catalog.ndsu.edu/academic-policies/grades/#gradechangestext) has the authority to hear charges of inequitable or biased academic evaluations and to provide redress for any improper evaluations it may find to have taken place. This

process is for course grades assigned by the instructors of the courses, including grades for independent study, thesis, and dissertation credits. Policy 337 (https://www.ndsu.edu/fileadmin/policy/337.pdf) has the procedural details. Salient points repeated here are that the student must initiate a request for a change of grade with the instructor within 15 instructional days of the first day of the semester immediately following the semester in which the grade was awarded. During an appeal, the burden of proof is on the student.

Academic Dishonesty

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 (https://www.ndsu.edu/fileadmin/policy/601.pdf)" and Section 335 (https://www.ndsu.edu/fileadmin/policy/335.pdf) of the NDSU Policy Manual. 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 to the Dean of the Graduate College that the student be suspended or expelled 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. (https://catalog.ndsu.edu/academic-policies/grades/#gradechangestext) 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 the graduate student following the procedures outlined below.

Appeal of Activities Intrinsic to the Acquisition of a Graduate Degree

All other appeals are addressed through the Graduate College appeal process. The burden of proof lies with the graduate student. These appeals may address dismissal from a graduate program or the Graduate College, sanctions beyond the course grade for academic misconduct or dishonesty, and degree-acquisition processes that are unique to graduate education. The processes intrinsic to graduate education include specification of degree requirements, preliminary and qualifying examinations, disquisition writing and approval, and possible dismissal from the program.

Appeals of processes intrinsic to graduate students are complicated in that there may be different levels of individuals and committees involved depending on the nature of the specific grievance. An additional complication is that for some complaints, levels prior to the Graduate Dean are advisory in nature and cannot supersede a decision of the Graduate Dean. The steps outlined below will vary in number depending on the nature of the grievance as no relevant level may be skipped. The first step begins with the person/committee most closely related to the grievance. Additional steps are added with each level of reporting above the initial level. The table below indicates which individuals/committees should be included for specific issues. If there is an issue that a student wishes to appeal that is not included in the table and is not covered by another policy and appeal process, the student should consult with the Graduate School regarding the steps to take. This consultation should be documented in writing and the resolution signed by the Graduate Dean.

Topic of Grievance	Levels of Appeal	Decisions Prior to Graduate Dean are Only Advisory
Preliminary/comprehensive exam or final defense	Supervisory Committee Graduate Program Committee Dept Head/Chair Academic Dean Graduate Appeals Committee	No
Disquisition writing and approval	Supervisory Committee Graduate Program Committee Dept Head/Chair Academic Dean Graduate Appeals Committee	No
Degree requirements	Supervisory Committee Graduate Program Committee Dept Head/Chair Graduate Appeals Committee	Program Specific Requirements - No Requirements in Graduate Bulletin -Yes
Dismissal	Supervisory Committee Graduate Program Committee Dept Head/Chair Academic Dean Graduate Appeals Committee	Yes
Additional Penalties for Academic Misconduct Beyond Course Grade (Not including Suspension/Expulsion)	Supervisory Committee Graduate Program Committee Dept Head/Chair Academic Dean Graduate Appeals Committee	No

Research in which the student is involved	PI Dept Head/Chair Academic Dean Graduate Appeals Committee	No

Note. For the Supervisory Committee level, appeals should be submitted to the chair of the student's supervisory committee (i.e., the student's advisor). For the Graduate Program level, the appeal should be submitted to the Graduate Program Coordinator. If the program does not have a coordinator, the head or chair of the department should receive the appeal. For the Graduate Appeals Committee, the appeal should be submitted to the Graduate Dean. In each case the person receiving the appeal has the responsibility to consult with the other members of the committee or program regarding the appeal.

Appeals Process

Step 1: Initiating an Appeal: Within 30 calendar days of the date of the aggrieved action, the graduate student requesting consideration of a grievance must complete the Graduate Student Appeals form and provide a written memorandum stating the nature of the grievance, parties involved and requested remedy. The student should include relevant supplementary material that will support their grievance. The student then submits the appeal form and supplementary material to the first level indicated on the table above. Once submitted, the only materials that can be added to the appeal are documents that are requested by any level of reviewers.

Step 2: Initial Response to Appeal: Within 10 business days, the respondent to the appeal (in consultation with the relevant committee if applicable) shall record their decision to support or not support the appeal on the appeals form and attach a written memorandum explaining the basis for the decision. If the respondent at this level supports the appeal and has the ability to reverse the decision being appealed, they will implement that decision and the appeals process will be concluded. If the respondent does not have the ability to reverse the decision, the response will be considered advisory to the level that does have this ability.

Steps 3+: If the student is unsatisfied with the decision at the previous level, the student may move their appeal forward to the next level within 10 business days of the respondent's response by submitting all materials accumulated to date regarding the appeal, including the Graduate Student Appeals Form, the student's memorandum, and the respondant(s)' memo(s). At each step, the respondent will, within 10 business days, record their decision to support or not support the appeal on the appeals form and attach a written memorandum explaining the basis for the decision. If the respondent at this level supports the student's appeal and has the ability to reverse the decision being appealed, they will implement that decision and the appeals process will be concluded. If the respondent does not have the ability to reverse the decision, the response will be considered advisory to the level that does have this ability.

Graduate Student Appeals Committee

If the student is not satisfied with the outcome at prior levels, the student may bring the appeal to the Graduate Student Appeals committee by submitting the appeals form and all documentation generated in the prior steps to the Graduate Dean within 10 business days of the most recent date on the documentation. The dean, in turn, informs the committee of the appeal and provides them with all documentation.

The graduate student appeals committee has five members and is constituted by the Graduate Dean each academic year to handle all appeals for that year. Four of the members must be graduate faculty who are members of the Graduate Council. A graduate student member of the committee will be selected from a pool of graduate students that includes the student members of the Graduate Council and four students nominated by the Graduate Student Council. Two additional graduate faculty members of the Graduate Council and one graduate student from the pool must be designated as alternates when the committee is formed. Any member of the appeals committee who had a role in a previous level of the appeals process must recuse themselves from the committee for that appeal. They must be replaced by an alternate member for that appeal. 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. If a challenge is deemed to have merit, that member is replaced by an alternate for that appeal. The five committee members elect the chair of the committee from its membership.

The burden of proof shall be with the appealing graduate student. The appealing graduate student has the right to 1) be given due notice by the Dean of the Graduate College 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 their rights to a closed hearing. The hearing, but not the appeals committee's deliberations, will be audio recorded.

The decisions and recommendations of the appeals committee shall be by majority vote. Depending on the type of grievance (see table), the committee's decision is either final or is advisory to the Dean of the Graduate College. In either case, the Dean is responsible for taking appropriate action to implement the decision. Any further appeal shall be directed to the Provost 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.

Akhmedov, Azer, Professor of Mathematics
Ph.D., 2004, Yale University
Al Asady, Ahmad, Assistant Professor of Management and Marketing
Ph.D., 2020, Kent State University
Aldrich-Wolfe, Laura, Associate Professor of Biological Sciences
Ph.D., 2006, Cornell University
Alfonseca Cubero, Maria, Professor of Mathematics
Ph.D., 2003, Universidad Autonoma de Madrid
Aly Ahmed, Bakr, Associate Professor of Architecture & Landscape Architecture
Ph. D., 2001, Virginia Polytechnic Institute and State University
Ambrosio, Thomas, Professor of Criminal Justice & Political Science
Ph.D. 2000, University of Virginia
Andrianova, Anastassiya, Associate Professor of English
Ph.D., 2011, City University of New York
Anwar, Zahid, Associate Professor of Computer Science
Ph.D., 2002, University of Illinois Champagne- Urbana
Archbold, Carol, Professor of Criminal Justice & Political Science
Ph.D., 2002, University of Nebraska-Omaha
Arnold, Lisa, Associate Professor of English
Ph.D., 2011, University of Louisville
Asa, Eric, Associate Professor of Construction Management & Engineering
Ph.D., 2000, University of Alberta
Azarmi, Fardad, Professor of Mechanical Engineering
Ph.D., 2008, University of Toronto
Baggett, Ashley, Associate Professor of History, Philosophy & Religious Studies
Ph.D., 2014, Louisiana State University
Balas, Benjamin, Professor of Psychology
Ph.D., 2007 Massachusetts Institute of Technology
Baldwin, Thomas, Assistant Professor of Plant Pathology
Ph.D., 2013, University of Georgia
Banawi, Abdulaziz Ali H, Assistant Professor of Construction Management & Engineering
Ph.D., 2013, University of Pittsburgh
Bandillo, Nonoy, Assistant Professor of Plant Sciences
Ph.D., 2016, University of Nebraska-Lincoln
Banerjee, Samiran, Assistant Professor of Microbiological Sciences

Ph.D., 2012, University of Saskatchewan
Banerjee, Somnath, Associate Professor of Management and Marketing
Ph.D., 2015, University of Central Florida
Barabanov, Nikita, Professor of Mathematics
Ph.D., 1979, Leningrad University
Barrett, Tracy, Associate Professor of History, Philosophy & Religious Studies
Ph.D., 2007, Cornell University
Bauer, Marc, Associate Professor of Animal Science
Ph.D., 1996, University of Kentucky
Bauroth, Nicholas, Professor of Criminal Justice & Political Science
Ph.D., 2003, Loyola University
Beck, Stephenson, Professor of Communication
Ph.D., 2008, University of Kansas
Beik, Omid, Assistant Professor of Electrical and Computer Engineering
Ph.D., 2012, McMaster University
Benton, Bradley, Associate Professor of History, Philosophy & Religious Studies
Ph.D., 2012, University of California Los Angeles
Berg, Eric, Professor of Animal Science
Ph.D., 1996, Purdue University
Berg, Erika, Associate Professor of Animal Science
Ph.D., 2006, University of Missouri
Berti, Marisol, Professor of Plant Sciences
Ph.D., 2007, North Dakota State University
Bertolini, Charles, Professor of Architecture & Landscape Architecture
Ph.D., 2008, Temple University
Bezbaruah, Achintya, Professor of Civil & Environmental Engineering
Ph.D., 2002, University of Nebraska-Lincoln
Bilen-Green, Canan, Professor of Industrial and Manufacturing Engineering
Ph.D., 1998, University of Wyoming
Bitzan, John, Professor of Management and Marketing
Ph.D., 1997, University of Wisconsin-Milwaukee
Blankenship, Anne, Associate Professor of History, Philosophy & Religious Studies
Ph.D., 2012, University of North Carolina at Chapel Hill
Boetel, Mark, Professor, School of Natural Resource Sciences
Ph.D., 1996, South Dakota State University
Boonstoppel, Sarah, Assistant Professor of Criminal Justice & Political Science
Ph.D., 2014, University of Maryland, College Park
Borr, Mari, Professor, Family and Consumer Sciences Education
Ph.D., 2005, University of North Dakota
Bowsher, Julia, Professor of Biological Sciences
Ph.D., 2007, Duke University
Boynton, Jason, Associate Professor of Mathematics
Ph.D., 2006, Florida Atlantic University
Braaten, Benjamin, Professor of Electrical & Computer Engineering
Ph.D. 2009, North Dakota State University
Brandel, Jennifer, Assistant Professor of Architecture
M.F.A,. 2018, California College of the Arts
Brekke, Jeremy, Associate Professor of Music
D.A., 2004, University of North Colorado
Bridgelall, Raj, Associate Professor of Transportation and Logistics
Ph.D., 2015, North Dakota State University
Briggs, Steven, Associate Professor of Criminal Justice & Political Science
Ph.D., 2007, University of Nebraska-Omaha
Bromley, Kimble, Professor of Visual Arts
M.F.A., 1986, Southern Illinois University
Brotherson, Sean, Professor of Human Development and Family Science
Ph.D., 2000, Oregon State University
Buchholz Holland, Carol, Associate Professor of Counselor Education
Ph.D., 2005, Kansas State University
Buettner-Schmidt, Kelly, Professor of Nursing
Ph.D., 2013, University of New Mexico
Burghaus, Uwe, Associate Professor of Chemistry and Biochemistry

Ph.D., 1995, Free University of Berlin
Burns, Kelly, Assistant Professor of Music
D.M.A., 2018, University of North Carolina at Greensboro
Burt, Sean, Assistant Professor of History, Philosophy & Religious Studies
Ph.D., 2009, Duke University
Byrd, Christopher, Assistant Professor of Animal Science
Ph.D., 2018, Purdue University
Cannayen, Igathinathane, Associate Professor of Agricultural & Biosystems Engineering
Ph.D., 1997,Indian Institute of Technology
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Ph.D., 1978, University of California-Davis
Sedivec, Kevin, Professor, School 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, Professor of Mathematics
Ph.D., 2010, Texas A & M University
Sharma, Anupa, Assistant Professor of Agribusiness & Applied Economics
Ph.D., 2016, Virginia Polytechnic Institute and State University
Shen, Gang, Associate Professor of Statistics
Ph.D., 2009, Purdue University
Shetty, Kalidas, Professor of Plant Sciences
Ph.D., 1989, University of Idaho
Shume, Teresa, Associate Professor, School of Education
Ph.D., 2013, University of North Dakota
Sibi, Mukund, Professor of Chemistry and Biochemistry
Ph.D., 1980, City University of New York
Signor, Sarah, Assistant Professor of Biological Sciences
Ph.D., 2013, University of California, Davis
Singh, Jagdish, Professor of Pharmaceutical Sciences
Ph.D., 1982, Banaras Hindu University, Varanasi, India
Sinha, Sangita, Professor of Chemistry and Biochemistry
Ph.D., 2000, Purdue University
Skoy, Elizabeth, Professor of Pharmacy Practice
Pharm.D., 2007, North Dakota State University
Slater, Kelsey, Assistant Professor of Health, Nutrition & Exercise Science
Ph.D., 2021, Mississippi State University
Smith, Gary, Professor of Civil, Construction, and Environmental Engineering
Ph.D., 1986, Purdue University
Smith, Angela, Professor of History, Philosophy & Religious Studies
Ph.D., Middle Tennessee University
Srinivasan, Sudarshan, Professor of Electrical & Computer Engineering
Ph.D., 2007, Georgia Institute of Technology
Stastny, Sherri, Professor of Health, Nutrition & Exercise Science
Ph.D., 2007, North Dakota State University
Steele, Dean, Associate Professor of Agricultural & Biosystems Engineering
Ph.D., 1991, University of Minnesota
Steffen, Kristine, Professor of Pharmaceutical Sciences
Ph.D., 2007, North Dakota State University
Stevens, Charles, Professor of Management and Marketing
Ph.D., 1998, University of Kansas
Steward, David, Professor of Civil & Environmental Engineering
Ph.D., University of Minnesota
Stichman, Amy, Associate Professor of Criminal Justice
Ph.D., 2003, University of Cincinnati
Stockwell, Craig, Professor of Biological Sciences
Ph.D., 1995, University of Nevada-Reno
Stokka, Gerald, Associate Professor of Animal Science
DVM, 1982, Iowa State University
Strand, Bradford, Professor of Health, Nutrition & Exercise Science

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
Straub, Jeremy, Associate Professor of Computer Science
Ph.D., 2015 University of North Dakota
Striker, Jessica, Professor of Mathematics
Ph.D., 2008, University of Minnesota
Sun, Chengwen, Associate Professor of Pharmaceutical Sciences
Ph.D., 1996, Norman Bethune University of Medical Sciences
Sun, Dali, Assistant Professor of Electrical & Computer Engineering
Ph.D., University of Tokyo
Sun, Xin, Associate Professor of Agricultural & Biosystems Engineering
Ph.D., 2013, Nanjing Agricultural University
Suzen, Yildirim, Associate Professor of Mechanical Engineering
Ph.D., 1998, Wichita State University
Swanson, Kendall, Professor of Animal Science
Ph.D., 2000, University of Kentucky
Swenson, David, Associate Professor of Visual Arts
Ph.D., 2006, Queens University
Syvertson, Eric, Assistant Professor of Visual Arts
M.F.A., 2014, Minneapolis College of Art and Design
Szmerekovsky, Joseph, Professor of Management and Marketing
Ph.D., 2003, Case Western Reserve University
Tackett, Lydia, Associate Professor of Geosciences
Ph.D., 2014, University of Southern California
Tangen, Jodi, Associate Professor of Counselor 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
Templeton, Karisa, Assistant Professor, Challey School of Music
D.M., Indiana University
Theile, Verena, Associate Professor of English
Ph.D., 2006, Washington State University
Thomas, Laura, Associate Professor of Psychology
Ph.D., 2008, University of Illinois at Urbana-Champaign
Thompson, Asunta, Associate Professor of Plant Sciences
Ph.D., 1998, University of Idaho
Thompson, Kevin, Professor of Criminal Justice & Political Science
Ph.D., 1986, University of Arizona
Thompson, Rachel, Assistant Professor of Accounting & Information Systems
Ph.D., University of Minnesota
Tian, Ruilin, Professor of Accounting & Information Systems
Ph.D., 2008, Georgia State University
Tida, Umamaheswara Rao, Assistant Professor of Electrical & Computer Engineering
Ph.D., University of Notre Dame
Travers, Steven, Associate Professor of Biological Sciences
Ph.D., 1998, University of California, Santa Barbara
Ubhaya, Vasant, Professor of Computer Science
Ph.D., 1971, University of California-Berkeley
Ulven, Chad, Professor of Mechanical Engineering
Ph.D., 2005, University of Alabama, Birmingham
Ungar, Abraham, Professor of Mathematics
Ph.D., 1973, Tel-Aviv University
Uppala, Vishal, Assistant Professor of Accounting and Information Systems
Ph.D., University of North Caroline at Greensboro
Urness, Cindy, Associate Professor of Architecture & Landscape Architecture
M.Arch., 1988, Pratt Institute
Vachal, Kim, Associate Professor of Transportation and Logistics

Ph.D., George Mason University
Varland, Rooth, Professor of Theatre Arts
M.F.A, 1989, Northwestern University
Venkatachalem, Sathish, Associate Professor of Pharmaceutical Sciences
Ph.D., 2003, University of Madras
Vettern, Rachelle, Professor, Extension Center for 4-H Youth Development
Ph.D., 2006, North Dakota State University
Visilia, Anna-Marie, Associate Professor of Landscape Architecture
Ph.D., 1996, University of Pennsylvania
Vold, Jessica, Assistant Professor of Mechanical Engineering
Ph.D., 2015, North Dakota State University
Voldseth, Deirdre, Professor, School of Natural Resource Sciences
Ph.D., 2005, Washington State University
Voronov, Andriy, Professor of Coatings & Polymeric Materials
Ph.D., 1994, Lviv Polytechnic Institute, Lviv, Ukraine
Wachenheim, Cheryl, Professor of Agribusiness & Applied Economics
Ph.D., 1994, Michigan State University
Wageman, Justin, Professor, School of Education
Ph.D., 1999, University of North Dakota
Wagner, Carsten, Associate Professor of Physics
Ph.D., 1997, Oxford University
Walden, Justin, Associate Professor of Communication
Ph.D., 2013, Penn State University
Wallin, Kimberly, Dean, College of Science & Math
Ph.D., University of Wisconsin-Madison
Wang, Danling, Associate Professor of Electrical & Computer Engineering
Ph.D., 2003, Peking University
Ph.D., 2013, University of Washington
Wang, Wen, Assistant Professor of Human Development and Family Science
Ph.D., 2018, Michigan State University
Wang, Xinnan, Associate Professor of Mechanical Engineering
Ph.D., 2008, University of South Carolina
Wang, Yechun, Associate Professor of Mechanical Engineering
Ph.D., 2007, University of Maryland at College Park
Ward, Alison, Associate Professor of Animal Science
Ph.D., 2011, University of Saskatchewan
Weber, Michael, Professor of Music
D.M.A., 1990, University of Arizona
Weber Knopp, Christina, Professor of Sociology and Anthropology
Ph.D., 2005, State University of New York, Buffalo
Webster, Dean, Professor of Coatings & Polymeric Materials
Ph.D., 1984, Virginia Polytechnic Institute and State University
Werremeyer, Amy, Professor of Pharmacy Practice
Pharm.D., 2005, North Dakota State University
West, Todd, Professor of Plant Sciences
Ph.D., 2004, Southern Illinois University
Westerman, David, Associate Professor of Communication
Ph.D., 2007, Michigan State University
Whitsel, Christopher, Associate Professor of Sociology and Anthropology
Ph.D., 2009, Indiana University
Wick, Abbey, Associate Professor, School of Natural Resource Sciences
Ph.D., 2007, University of Wyoming
Wilkinson, John, Associate Professor of Chemistry and Biochemistry
Ph.D., 2001, Vanderbilt University
Wilson, William, Professor of Agribusiness & Applied Economics
Ph.D., 1980, University of Manitoba
Wing, Heath, Associate Professor of Modern Languages
Ph.D., 2015, Texas Tech University
Wischer, Stephen, Associate Professor of Architecture & Landscape Architecture
M. Arch., 2004, University of Calgary
M.F.A., 2004, University of Calgary
Wissman, Kathryn, Assistant Professor of Psychology

Ph.D., 2016 Kent State University
Wood, Nathan, Associate Professor, School of Education
Ph.D., 2006, University of Minnesota
Wood, Scott, Professor of Geosciences
Ph.D., 1985, Princeton University
Wottrich, Tyler, Associate Professor of Music
D.M.A., Stony Brook University
Wright, Newell, Professor of Management and Marketing
Ph.D., Virginia Polytechnic Institute and State University
Wu, Di, Associate Professor of Electrical & Computer Engineering
Ph.D., 2011, Polytechnic University of Turin
Ph.D., Zhejiang University
Wu, Xiangfa, Professor of Mechanical Engineering
Ph.D., 2003, University of Nebraska
Xia, Wenjie, Assistant Professor of Civil & Environmental Engineering
Ph.D., 2016, Northwestern University
Xu, Minwei, Assistant Professor of Plant Sciences
Ph.D., 2019, North Dakota State University
Yan, Changhui, Professor of Computer Science
Ph.D., 2005, Iowa State University
Yan, Guiping, Associate Professor of Plant Pathology
Ph.D., Washington State University
Yang, Mijia, Associate Professor of Civil & Environmental Engineering
Ph.D., 2006, University of Akron
Yang, Zhongyu, Associate Professor of Chemistry and Biochemistry
Ph.D.,, 2010, University of Pittsburgh
Yellavajjala, Ravi Kiran, Associate Professor of Civil & Environmental Engineering
Ph.D., 2014, University of Notre Dame
Yodo, Nita, Assistant Professor of Industrial & Manufacturing Engineering
Ph.D., 2017, Wichita State University
Yu, Yao, Associate Professor of Construction Management & Engineering
Ph.D., 2014, North Carolina Agricultural and Technical State University
Yuan, Mingao, Assistant Professor of Statistics
Ph.D., 2018, Purdue University
Zarak, Jenny, Associate Professor, School of Education
Ph.D., 2011, University of Illinois at Urbana-Champaign
Zeng, Cheng, Assistant Professor of Communication
Ph.D., 2018, University of Jyvaskyla
Zhang, Limin, Associate Professor of Accounting & Information Systems
Ph.D., 2006, University of Arizona
Zhang, Qi, Associate Professor of Plant Sciences
Ph.D., 2007, Kansas State University
Zhang, Qifeng, Associate Professor of Electrical & Computer Engineering
Ph.D., 2001, Peking University
Zhang, Wei, Professor of Accounting & Information Systems
Ph.D., 2001, Syracuse University
Zhang, Yan, Associate Professor of Mechanical Engineering
Ph.D., 2013, Iowa State University
Zhao, Pinjing, Professor of Chemistry and Biochemistry
Ph.D., 2003, Cornell University
Zhong, Shaobin, Professor of Plant Pathology
Ph.D., 2000, North Dakota State University
Zuk, Alan, Associate Professor of Plant Sciences
Ph.D., 2005, Kansas State University

Affiliate Graduate Faculty

Other qualified individuals who are not Full Graduate Faculty members may contribute to the scholarship and professional development of our graduate students. Affiliate Members of the Graduate Faculty are qualified by educational background and experience to effectively teach and mentor students in graduate programs at NDSU. An appointment for Affiliate Graduate Faculty status is initiated by a graduate program. The chair, head, or director of the academic unit in which the program resides will submit the Affiliate Graduate Faculty Nomination form (https://powerforms.docusign.net/b51d1f0b-7075-44f9-be79-59648eeac0d0/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) and a current

curriculum vitae. The request should include the level of Affiliate Faculty Membership the program proposes the applicant should be given. This request is forwarded to the dean of the academic college in which the program resides for approval. If approved, the request is submitted to the College of Graduate and Interdisciplinary Studies. The request will be reviewed by a subcommittee of the Graduate Council which will make a recommendation to the Dean of the College of Graduate and Interdisciplinary Studies, who will determine whether an appointment will be granted. A reappointment may be granted using the process described above.

Members of the Graduate Faculty who have left the institution may be granted Affiliate Faculty status as outlined below:

- Emeritus Faculty. Persons who are granted emeritus faculty status are eligible for Affiliate Faculty Level 1 status for a period of three years. Membership as an Affiliate Faculty may be renewed upon approval of the Graduate Council and the Dean of the College of Graduate and Interdisciplinary Studies.
- Individuals who have retired or left NDSU for other employment opportunities are eligible serve as chair (advisor) of supervisory committees for one year.
  - This is not renewable.
  - This eligibility does not apply to committee membership other than the chair (advisor).
- A department may nominate the individual for Affiliate Faculty status as outlined below.

There are three levels of Affiliate Graduate Faculty Members, the appointment level will be determined by the qualifications of the applicant.

Affiliate Graduate Faculty Level 1

Duties

- Chair committees for graduate students (may be approved to chair committees for Ph.D. programs, professional doctoral programs or both)
- Serve on committees for all students
- Teach graduate courses

Criteria

- Terminal degree
- Sustained record of scholarly and/or creative accomplishment, and/or (for professional doctoral programs only) professional practice appropriate to the discipline
- Demonstrated competence in instruction including classroom, advising, or mentoring
- Full-time employment at an NDSU on-campus unit or a Research and Extension Center

Term

- 6 years
- Must demonstrate sustained record of scholarly and/or creative accomplishment
- Demonstrated competence in graduate instruction including classroom, advising, or mentoring

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Affiliate Graduate Faculty Level 2

Duties

- Chair committees for all master's students
- Serve as co-chair for all doctoral students (the other co-chair must be a full member of the graduate faculty)
- Serve on committees for all students
- Teach graduate courses

Criteria

- Terminal degree
- Record of scholarly or creative accomplishment
- Demonstrated experience in teaching, mentoring, or advising

Term

- 3 years
- Must demonstrate sustained record of scholarly or creative accomplishment
- Demonstrated competence in graduate teaching, advising, or mentoring

Affiliate Graduate Faculty Level 3

Duties

- Chair committees for students not required to complete a dissertation, thesis, or scholarly paper
- Serve on committees for all students
- Teach graduate courses (but no higher than his/her earned degree)

Criteria

- Record of professional achievement in an area related to the program
- Demonstrated competence in teaching

Term

- 3 years
- Must demonstrate sustained record of professional achievement in an area related to the program
- Active involvement in graduate teaching and work with graduate students (but no higher than his/her earned degree)

Affiliate Graduate Faculty Members

The list below is grouped by the AGF Level for which they were approved. There term ends on the last day of the semester indicated below their name.

Level 1

Addey, Kwame, Agribusiness and Applied Economics
2029 Summer
Bajwa, Sreekala, Agricultural and Biosystems Engineering
2026 Spring
Banerjee, Amrita, Pharmaceutical Sciences
2024 Fall
Benna, Justin, School of Education
2029 Fall
Benning, Kerri, School of Nursing
2029 Spring
Biermacher, Jon, Agribusiness and Applied Economics
2029 Spring
Borowicz, Pawel, Animal Sciences
2029 Summer
Boyer, Jeffrey, College of Science and Math
2029 Fall
Brunsvold, Abigail, School of Nursing
2029 Spring
Bullock, David, Agribusiness and Applied Economics
2024 Fall
Buncher, John, Physics
2027 Fall
Carson, Paul, Public Health
2027 Spring
Cernusca, Dan, Pharmacy Practice
2027 Spring
Chapara, Venkata, Plant Pathology
2028 Fall
Condry, Danielle, Microbiological Sciences
2025 Spring
Dimler, Laurel, School of Nursing
2025 Spring
Dresecher, Matthew, Health, Nutrition and Exercise Science
2029 Fall
Dybing, Alan, Transportation and Logistics
2026 Spring
Ewert, Dan, Electrical and Computer Engineering

2027 Spring
Falk, Kara, School of Nursing
2025 Spring
Foye, Brandon, Health, Nutrition and Exercise Science
2028 Fall
Fraase, Kolby Schaeffer, School of Nursing
2026 Spring
Geaumont, Benjamin, School of Natural Resource Sciences
2030 Spring
Gross, Dean, School of Nursing
2029 Summer
Hammed, Ademola, Agricultural and Biosystems Engineering
2026 Spring
Heilman Morales, Ana, Agricultural and Biosystems Engineering
2030 Spring
Hoang, Khang, Physics
2028 Spring
Hough, Jill, Upper Great Plains Transportation Institute
2025 Summer
Kalina, Emily, School of Nursing
2027 Fall
Kenzie, Daniel, English
2024 Fall
Klug, Page, Biological Sciences
2025 Spring
Koparan, Cengiz, Agricultural and Biosystems Engineering
2026 Fall
Leitch, Jay, Agribusiness and Applied Economics
2026 Spring
Littlefield, Robert, Communication
2027 Spring
Lopez-Martinez, Giancarlo, Biological Sciences
2025 Spring
McCaul, Kevin, Psychology
2024 Fall
McQueston, Jessica, School of Education
2027 Fall
Mushet, David, Environmental and Conservation Science
2025 Spring
Nahar, Nurun, Agricultural and Biosystems Engineering
2024 Fall
Nelson, Carrie, School of Nursing
2029 Spring
Ostlie, Michael, Plant Sciences
2028 Fall
Peltier, Allison, School of Nursing
2029 Spring
Prasifka, Jarrad, Entomology
2027 Fall
Qi, Xiaoning, Coatings and Polymeric Materials
2027 Spring
Rabia, Ahmed Harb, Agricultural and Biosystems Engineering
2030 Spring
Roseno, Ashley, Health, Nutrition and Exercise Science
2026 Spring
Saarinen, Heidi, School of Nursing
2029 Spring
Schauer, Christopher, Animal Sciences
2028 Fall
Staricka, James, Soil Science
2023 Fall
Tulibaski, Katherine, Management and Marketing

2027 Fall
Vachal, Kimberly, Agribusiness and Applied Economics
2028 Spring
Vanderburg, Kyle, Music
2028 Spring
Vetter, Stefan, Pharmaceutical Sciences
2029 spring
Vosen Callens, Melissa, Communication
2029 Summer
Williamson, Julia, Pharmacy Practice
2027 Spring
Wooldridge, Joshua, School of Nursing
2029 Fall
Yodo, Nita, Industrial & Manufacturing Engineering
2028 Fall
Yonk, Ryan, Agribusiness and Applied Economics
2026 Fall

Level 2

Ahlering, Marissa, Biological Sciences
2024 Fall
Alshami, Ali, Biomedical Engineering
2024 Fall
Amiri, Ali, Mechanical Engineering
2025 Summer
Anderson, James, Plant Sciences
2025 Spring
Beaver, James, Plant Sciences
2025 Fall
Benna, Justin, School of Education
2023 Fall
Blodgett Salafia, Elizabeth, Human Development and Family Science
2024 Fall
Bolton, Melvin, Plant Pathology
2026 Spring
Bortolon, Leandro, School of Natural Resource Sciences
2024 Fall
Carlson, Zachary, Animal Sciences
2026 Spring
Carr, Patrick, Plant Sciences
2025 Fall
Chao, Wun, Plant Sciences
2025 Fall
Crouse, Matthew, Animal Sciences
2027 Spring
Cushman, Robert, Animal Sciences
2027 Spring
da Silva Diniz, Wellison Jarles, Animal Sciences
2026 Spring
Daigh, Aaron, Soil Science
2025 Fall
Danielson, Jessica, School of Education
2026 Fall
Day, Stephanie, Biological Sciences
2026 Fall
Fauske, Gerald, School of Natural Resource Sciences
2026 Spring
Fiedler, Jason, Plant Sciences
2025 Fall
Forster, Shana, Plant Sciences
2026 Fall

Gasch, Caley, School of Natural Resource Sciences
2026 Spring
Grier, James, Biological Sciences
2026 Fall
Heitman, Joshua, School of Natural Resource Sciences
2027 Spring
Hendrickson, John, School of Natural Resource Sciences
2027 Spring
Hoffman, Jeanette, School of Education
2026 Fall
Jansen, Rick, Public Health
2026 Spring
Johnson, Blaine, Plant Sciences
2025 Fall
Kalil, Audrey, Plant Sciences
2026 Fall
Kandel, Shyam, Plant Pathology
2025 Fall
Kelley, Suzzanne, History, Philosophy and Religion
2025 Fall
Kim, James, Agricultural and Biosystems Engineering
2026 Fall
Laam, Leslie, Public Health
2026 Spring
Le, Trung, Industrial & Manufacturing Engineering
2025 Fall
Lemieux, Mariane, Challey School of Music
2026 Spring
Maassel, Michael, Electrical and Computer Engineering
2024 Spring
Maddock, Robert, Animal Science
2026 Spring
McCall, Mary, English
2026 Fall
McFadden, Lisa, Biomedical Engineering
2026 Spring
Mulligan, Lawrence, Electrical and Computer Engineering
2024 Fall
Nicolay, Katelyn, Health, Nutrition and Exercise Science
2024 Fall
O'Brien, Peter, Soil Science
2026 Fall
Otto, Clint, School of Natural Resource Sciences
2026 Spring
Pourhashem, Ghasideh, Coatings and Polymeric Materials
2026 Spring
Pradhan, Gautam Prasad, Plant Sciences
2025 Fall
Reed, Wendy, Biological Sciences
2026 Fall
Riley, David, Animal Sciences
2026 Fall
Rinehart, Joseph, Biological Sciences
2026 Fall
Sarkar, Niloy Chandra, Agricultural and Biosystems Engineering
2025 Spring
Schachterle, Jeffrey, Plant Pathology
2025 Fall
Schaefer, Lauren, Psychology
2024 Fall
Simsek, Senay, Plant Sciences
2025 Fall

Smith, Matthew, Biological Sciences
2024 Fall
Tobin, Colin, Animal Sciences
2026 Spring
Vangsness Frisch, Jane, School of Education
2027 Spring
Vonnahme, Kimberly, Animal Sciences
2026 Spring
Walia, Gursimaran, Computer Science
2026 Fall
Ward, Alison, Animal Sciences
2026 Spring
Wehbi, Nizar, Public Health
2025 Fall
White, Joel, Health, Nutrition and Exercise Science
2024 Fall
Wick, Abbey, School of Natural Resource Sciences
2026 Fall
Wiersma, Jochum, Plant Sciences
2025 Fall
Yadav, Om Prakash, Industrial & Manufacturing Engineering
2025 Fall
Yang, Shengming, Plant Sciences
2025 Fall
Yu, Haipeng, Animal Sciences
2026 Fall
Zeleznik, Joe, School of Natural Resource Sciences
2027 Spring

Level 3

Bonnett, David, PlantSciences
2026 Fall
Carlson, Craig, Plant Sciences
2025 Fall
Challey, Connor, Challey School of Music
2025 Fall
Clifton, James, Accounting and Information Systems
2026 Spring
Degges, Ronald, Statistics
2026 Fall
DiFiore, Lindsey, Accounting and Information Systems
2026 Spring
Disrud, Stephen, Modern Languages
2026 Spring
Doekott, Curt, Statistics
2026 Fall
Dykes, Linda, Plant Sciences
2025 Fall
Emerson, Nancy, Accounting and Information Systems
2026 spring
Faris, Justin, Plant Sciences
2025 Fall
Franco, Jose, Plant Sciences
2025 Fall
Fugate, Karen, Plant Sciences
2025 Fall
Gesch, Russell, Plant Sciences
2025 Fall
Grusak, Michael, Plant Sciences
2025 Fall
Gupta, Rajeev, Plant Sciences

2025 Fall
Haagenson, Darrin, Plant Sciences
2025 Fall
Horvath, David, Plant Sciences
2025 Fall
Hulke, Brent, Plant Sciences
2025 Fall
Knapp, Caprice, Public Health
2025 Fall
Kotala, Pratap, Computer Science
2025 Fall
Larson, Jamee, English
2027 Spring
Mergoum, Mohamed, Plant Sciences
2025 Fall
Myronovych, Oksana, Computer Science
2026 Spring
Nandety, Raja Sekhar, Plant Sciences
2025 Fall
Newman, Tracy, Public Health
2025 Fall
Njau, Grace, Public Health
2025 Fall
Noonan, Benjamin, Biomedical Engineering
2024 Fall
Ohm, Jae-Bom, Plant Sciences
2025 Fall
O'Shea, Amber, School of Education
2024 Fall
Qi, Lili, Plant Sciences
2025 Fall
Rogers, James, Plant Sciences
2025 Fall
Ryan, Anneli, Modern Languages
2026 Spring
Samuelson, Lisa, Management and Marketing
2024 Fall
Sanders, Greg, Human Development and Family Science
2025 Spring
Sassi, Enrico, English
2025 Spring
Snider, Alexandria, Animal Sciences
2025 Fall
Travineck, Andrea, Natural Resources Management
2025 Fall
Trela, Brent, Plant Sciences
2025 Fall
Whitney, Amy, Biomedical Engineering
2025 Fall
Wonderlich, Stephen, Public Health
2025 Fall
Xu, Steve, Plant Sciences
2025 Fall

Affiliate Advisor

Short, Karensa, School of Natural Resource Sciences
2026 Spring
Worth, Elizabeth, College of Business
2026 Spring

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 (https://na3.docusign.net/Member/PowerFormSigning.aspx?PowerFormId=4833e793-7a58-47f4-9ae4-cbad0fae294f&env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&v=2) must be completed with a current copy of the nominee's curriculum vitae and any other pertinent documentation attached.

Graduate teaching waivers are approved by the Graduate Council and the Dean of the Graduate College. Waivers are granted for one academic year and may be renewed twice at the discretion of the Dean of the Graduate College.

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.

- ACE Tutoring (Academic Collegiate Enhancement) (https://www.ndsu.edu/ace/)
- Air Force ROTC (https://www.ndsu.edu/afrotc/)
- Army ROTC (http://www.ndsuarmyrotc.com/)
- Athletics (http://www.gobison.com/)
- Bookstore (http://www.ndsubookstore.com/)
- Career and Advising Center (https://career-advising.ndsu.edu/)
- Center for Accessibility & Disability Resources (https://www.ndsu.edu/disabilityservices/)
- Center for Writers (https://www.ndsu.edu/cfwriters/)
- Code of Student Conduct: Rights and Responsibilities of Community NDSU Policy 601 (https://www.ndsu.edu/fileadmin/policy/601.pdf)
- Counseling Center (https://www.ndsu.edu/counseling/)
- Customer Account Services (https://www.ndsu.edu/onestop/account/)
- Dining Services (https://www.ndsu.edu/dining_services/)
- Distance and Continuing Education (http://www.ndsu.edu/dce/)
- Financial Aid and Scholarships (https://www.ndsu.edu/onestop/finaid/)
- Information Technology (https://www.ndsu.edu/it/)
- International Student and Study Abroad Services (https://www.ndsu.edu/international/)
- Libraries (http://www.ndsu.edu/library/)
- Memorial Union (https://www.ndsu.edu/mu/)
- Military and Veterans Certification (https://www.ndsu.edu/veterans/)
- Multicultural Programs (https://www.ndsu.edu/multicultural/)
- One Stop (https://www.ndsu.edu/onestop/)
- President's Council for Diversity, Inclusion and Respect (https://www.ndsu.edu/inclusioncouncil/)
- Residence Life (https://www.ndsu.edu/reslife/)
- Student Activities (https://www.ndsu.edu/studentactivities/)
- Student Health Service (https://www.ndsu.edu/studenthealthservice/)
- Student Success Programs (https://www.ndsu.edu/studentsuccess/)
- Tri-College University (https://www.tri-college.org/)
- TRIO Programs (https://www.ndsu.edu/triosss/)
- Wallman Wellness Center (https://www.ndsu.edu/wellness/)

Programs of Study

Undergraduate Programs A-Z (p. 124)

Graduate Programs A-Z (p. 765)

No results found, please try again. Reset selections.

- AccountancyMaster'sBusiness StudiesAgriculture, Food Systems, and Natural Resources
- AccountingBusinessMajorMinorBusiness StudiesGlobal Perspectives, Cultures LanguagesPlanning Organizing
- Advertising and Design CertificateCertificateArts HumanitiesDesign CreativityPlanning OrganizingArts and Sciences
- Aerospace StudiesMinorEngineeringEducation Human ServicesPlanning Organizing
- Aging StudiesCertificateHealth and Human ServicesEducation Human ServicesHealth Life SciencesPlanning OrganizingSocial ChangeCertificate - Online Delivery
- AgribusinessAccelerated (UGRD to GRAD)MajorMinorAgricultureBusiness StudiesAgriculture, Food Systems, and Natural Resources
- Agribusiness and Applied EconomicsDoctoralMaster'sBusinessAgricultureBusiness Studies
- Agricultural EducationMajorEducation Human ServicesHuman BehaviorSocial ScienceAgriculture, Food Systems, and Natural Resources
- Agricultural and Biosystems EngineeringAccelerated (UGRD to GRAD)MajorEngineeringAgricultureSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Agricultural and Biosystems EngineeringDoctoralMaster'sEngineeringAgricultureSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Agricultural CommunicationMajorMinorCommunicationArts HumanitiesDesign CreativityArts and Sciences
- Agricultural EconomicsAccelerated (UGRD to GRAD)MajorAgricultureBusiness StudiesGlobal Perspectives, Cultures LanguagesAgriculture, Food Systems, and Natural Resources
- Agricultural EducationMaster'sEducation Human ServicesSocial ScienceOnline (GRAD)Agriculture, Food Systems, and Natural Resources
- Agricultural SciencesMajorAgricultureHealth Life SciencesNatural Physical SciencePlanning OrganizingTechology InformationAgriculture, Food Systems, and Natural ResourcesMajor - Online Delivery
- Animal ScienceAccelerated (UGRD to GRAD)MajorMinorAgricultureNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Agriculture, Food Systems, and Natural Resources
- Animal SciencesDoctoralMaster'sAgricultureHealth Life SciencesSTEM (Science, Technology, Engineering, Mathematics)Agriculture, Food Systems, and Natural Resources
- AnthropologyMajorMinorCommunicationEducation Human ServicesGlobal Perspectives, Cultures LanguagesHealth Life SciencesHuman BehaviorArts and Sciences
- AnthropologyMaster'sGlobal Perspectives, Cultures LanguagesNatural Physical ScienceSocial ScienceArts and Sciences
- Apparel, Retail Merchandising and DesignCertificateMajorMinorBusiness StudiesDesign CreativityGlobal Perspectives, Cultures LanguagesSocial ChangeArts and Sciences
- Applied EconomicsDoctoralAgricultureCommunicationPlanning OrganizingAgriculture, Food Systems, and Natural Resources
- ArchitectureMajorCommunicationArts HumanitiesDesign CreativityGlobal Perspectives, Cultures LanguagesPlanning OrganizingTechology InformationArts and Sciences
- ArtMajorMinorCommunicationArts HumanitiesDesign CreativityGlobal Perspectives, Cultures LanguagesArts and Sciences
- Art EducationMajorArts HumanitiesEducation Human ServicesSocial ScienceArts and Sciences
- Artificial IntelligenceMinorEngineeringCommunicationDesign CreativityPlanning OrganizingMinor - Online Delivery
- Athletic TrainingMaster'sHealth and Human ServicesHealth Life Sciences

- BankingBusinessMinorAgricultureCommunicationBusiness StudiesEducation Human ServicesHealth Life SciencesPlanning Organizing
- Behavioral StatisticsMajorBusiness StudiesHuman BehaviorSocial ScienceSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- Big Data Applied Statistics AnalysisCertificateEngineeringBusiness StudiesPlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)Techology InformationOnline (GRAD)
- BiochemistryDoctoralMaster'sNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- Biochemistry and Molecular BiologyAccelerated (UGRD to GRAD)MajorMinorAgricultureSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- Biological SciencesAccelerated (UGRD to GRAD)MajorMinorHealth Life SciencesNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- Biological SciencesDoctoralMaster'sHealth Life SciencesNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- Biological Sciences EducationMajorEducation Human ServicesHealth Life SciencesNatural Physical ScienceSocial ScienceArts and Sciences
- Biomedical EngineeringMinorEngineeringDesign CreativityHealth Life SciencesSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Biomedical EngineeringDoctoralMaster'sEngineeringHealth Life SciencesSTEM (Science, Technology, Engineering, Mathematics)Techology InformationOnline (GRAD)
- BiotechnologyAccelerated (UGRD to GRAD)MajorMinorAgricultureHealth Life SciencesNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Techology InformationAgriculture, Food Systems, and Natural Resources
- Business AdministrationBusinessMajorMinorCommunicationBusiness StudiesGlobal Perspectives, Cultures LanguagesPlanning OrganizingMajor - Online DeliveryMinor - Online Delivery
- Business AdministrationMaster'sBusinessCommunicationBusiness StudiesPlanning OrganizingTechology Information
- Business AnalyticsCertificateBusinessBusiness StudiesPlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Business AnalyticsBusinessCommunicationBusiness StudiesHuman BehaviorPlanning OrganizingTechology Information
- Business Analytics CertificateCertificateBusinessBusiness StudiesPlanning OrganizingTechology Information
- Business EducationMajorCommunicationBusiness StudiesEducation Human ServicesSocial ScienceTechology InformationArts and Sciences
- Cellular and Molecular BiologyDoctoralGraduate School and Interdisciplinary StudiesHealth Life SciencesNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)
- Cereal ScienceDoctoralMaster'sAgricultureNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Agriculture, Food Systems, and Natural Resources
- Certificate of Completion: First-Year SpanishCommunicationEducation Human ServicesGlobal Perspectives, Cultures LanguagesCertificate of CompletionArts and Sciences
- Certificate of Completion: Second-Year SpanishCommunicationEducation Human ServicesGlobal Perspectives, Cultures LanguagesCertificate of CompletionArts and Sciences
- Certificate of Completion: Third-Year SpanishCommunicationEducation Human ServicesGlobal Perspectives, Cultures LanguagesCertificate of CompletionArts and Sciences
- ChemistryAccelerated (UGRD to GRAD)MajorMinorNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- ChemistryDoctoralMaster'sNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- Chemistry EducationMajorEducation Human ServicesSocial ScienceArts and Sciences
- Civil and Environmental EngineeringDoctoralMaster'sEngineeringNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Techology Information

- Civil EngineeringAccelerated (UGRD to GRAD)MajorEngineeringDesign CreativitySTEM (Science, Technology, Engineering, Mathematics)
- Coatings & Polymeric MaterialsDoctoralMaster'sNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Techology InformationArts and Sciences
- Coatings and Polymeric MaterialsAccelerated (UGRD to GRAD)MinorGraduate School and Interdisciplinary StudiesNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- College Teaching CertificateCertificateGraduate School and Interdisciplinary StudiesCommunicationEducation Human ServicesOnline (GRAD)
- CommunicationDoctoralMaster'sCommunicationBusiness StudiesPlanning OrganizingSocial ScienceArts and Sciences
- Community DevelopmentMinorDesign CreativityEducation Human ServicesSocial ChangeSocial ScienceArts and Sciences
- Community DevelopmentMaster'sBusiness StudiesHealth Life SciencesHuman BehaviorPlanning OrganizingSocial ScienceOnline (GRAD)Arts and Sciences
- Comprehensive Science EducationMajorEducation Human ServicesSocial ScienceArts and Sciences
- Computer EngineeringAccelerated (UGRD to GRAD)MajorEngineeringPlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)Techology InformationMajor - Online Delivery
- Computer ScienceCertificateAccelerated (UGRD to GRAD)MajorMinorSTEM (Science, Technology, Engineering, Mathematics)Techology InformationArts and SciencesCertificate - Online Delivery
- Computer ScienceDoctoralMaster'sEngineeringSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Computer Science and MathematicsDual MajorsSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- Computer Science and PhysicsDual MajorsNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- Computer Science EducationDesign CreativityEducation Human ServicesSTEM (Science, Technology, Engineering, Mathematics)Techology InformationArts and Sciences
- Computer Science FoundationsCertificateEngineeringNatural Physical ScienceTechology InformationCertificate - Online Delivery
- Computing SystemsCertificateEngineeringNatural Physical SciencePlanning OrganizingTechology InformationCertificate - Online Delivery
- Construction EngineeringAccelerated (UGRD to GRAD)MajorEngineeringDesign CreativityPlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)
- Construction ManagementAccelerated (UGRD to GRAD)MajorEngineeringDesign CreativityPlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Construction ManagementCertificateMaster'sEngineeringDesign CreativityPlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)Online (GRAD)
- Core Computer Science CompetenciesCertificateEngineeringNatural Physical SciencePlanning OrganizingTechology InformationCertificate - Online Delivery
- Counselor EducationMaster'sCommunicationEducation Human ServicesHealth Life SciencesHuman BehaviorArts and Sciences
- Counselor Education and SupervisionDoctoralCommunicationEducation Human ServicesHealth Life SciencesHuman BehaviorArts and Sciences
- Creative WritingMinorCommunicationArts HumanitiesDesign CreativityArts and Sciences
- Criminal JusticeAccelerated (UGRD to GRAD)MajorMinorEducation Human ServicesHuman BehaviorSocial ChangeSocial ScienceArts and Sciences
- Criminal JusticeDoctoralMaster'sHuman BehaviorSocial ChangeSocial ScienceArts and Sciences
- Crop and Weed ScienceAccelerated (UGRD to GRAD)MajorMinorAgricultureNatural Physical ScienceTechology InformationAgriculture, Food Systems, and Natural Resources
- CybersecurityCertificateMajorEngineeringCommunicationTechology InformationMajor - Online DeliveryCertificate - Online Delivery
- Cybersecurity CertificateCertificateEngineeringDesign CreativityHuman BehaviorPlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)Techology InformationOnline (GRAD)

- Data ScienceCertificateMajorEngineeringCommunicationBusiness StudiesDesign CreativityNatural Physical SciencePlanning OrganizingTechology InformationMajor - Online DeliveryCertificate - Online Delivery
- Developmental ScienceDoctoralHealth and Human ServicesEducation Human ServicesHealth Life SciencesHuman BehaviorSTEM (Science, Technology, Engineering, Mathematics)
- DieteticsMaster'sHealth and Human ServicesEducation Human ServicesHealth Life SciencesHuman BehaviorOnline (GRAD)
- Digital Marketing and InnovationCertificateBusinessCommunicationBusiness StudiesDesign CreativityPlanning Organizing
- Discipline Based Education ResearchDoctoralGraduate School and Interdisciplinary StudiesEducation Human ServicesHealth Life Sciences
- Economic ComputationCertificateBusiness StudiesPlanning OrganizingTechology InformationAgriculture, Food Systems, and Natural Resources
- EconomicsAccelerated (UGRD to GRAD)MajorMinorBusiness StudiesGlobal Perspectives, Cultures LanguagesAgriculture, Food Systems, and Natural Resources
- Education - DoctoralDoctoralEducation Human ServicesHealth Life SciencesSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- Education - Master'sMaster'sEducation Human ServicesHealth Life SciencesOnline (GRAD)Arts and Sciences
- Educational LeadershipMaster'sEducation Human ServicesHealth Life SciencesPlanning OrganizingArts and Sciences
- Electrical and Computer EngineeringDoctoralMaster'sEngineeringSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Electrical EngineeringAccelerated (UGRD to GRAD)MajorEngineeringSTEM (Science, Technology, Engineering, Mathematics)Techology InformationMajor - Online Delivery
- Electrical Engineering and PhysicsDual MajorsEngineeringNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Elementary Education & Human Development and Family ScienceDual MajorsEducation Human ServicesSocial ScienceArts and Sciences
- Emergency ManagementAccelerated (UGRD to GRAD)MajorMinor
- EnglishMajorMinorCommunicationArts HumanitiesDesign CreativityGlobal Perspectives, Cultures LanguagesArts and Sciences
- EnglishMaster'sCommunicationArts HumanitiesArts and Sciences
- English EducationMajorEducation Human ServicesGlobal Perspectives, Cultures LanguagesSocial ScienceArts and Sciences
- Enterprise Resource PlanningCertificateBusinessCommunicationBusiness StudiesPlanning OrganizingOnline (GRAD)
- EntrepreneurshipCertificateBusinessMinorBusiness StudiesPlanning OrganizingMinor - Online DeliveryCertificate - Online Delivery
- Environmental and Conservation SciencesDoctoralMaster'sGraduate School and Interdisciplinary StudiesNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)
- Environmental DesignMajorArts HumanitiesDesign CreativityPlanning OrganizingTechology InformationArts and Sciences
- Environmental EngineeringMaster'sEngineeringNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Environmental Engineering MajorEngineeringAgricultureDesign CreativityGlobal Perspectives, Cultures LanguagesHealth Life SciencesHuman BehaviorNatural Physical SciencePlanning OrganizingSocial ChangeSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Equine Assisted ServicesMinorAgricultureCommunicationEducation Human ServicesSocial ChangeAgriculture, Food Systems, and Natural Resources
- Equine ScienceMajorMinorAgricultureHealth Life SciencesNatural Physical ScienceAgriculture, Food Systems, and Natural Resources
- Event ManagementCertificateBusinessCommunicationEducation Human ServicesPlanning OrganizingCertificate - Online Delivery
- Exercise ScienceAccelerated (UGRD to GRAD)MajorHealth and Human ServicesHealth Life SciencesHuman Behavior
- Exercise Science and NutritionDoctoralHealth and Human ServicesEducation Human ServicesHealth Life SciencesHuman Behavior
- Extension EducationMinorAgricultureSocial ChangeSocial ScienceArts and Sciences

- Extension EducationMaster'sAgricultureEducation Human ServicesOnline (GRAD)Agriculture, Food Systems, and Natural Resources
- Family and Consumer Science EducationMaster'sEducation Human ServicesOnline (GRAD)Agriculture, Food Systems, and Natural Resources
- Family and Consumer Sciences EducationMajorEducation Human ServicesHuman BehaviorSocial ScienceAgriculture, Food Systems, and Natural Resources
- Family Financial PlanningCertificateHealth and Human ServicesEducation Human ServicesHuman BehaviorPlanning OrganizingCertificate - Online Delivery
- Family Financial PlanningCertificateMaster'sHealth and Human ServicesBusiness StudiesPlanning OrganizingOnline (GRAD)
- FinanceCertificateBusinessMajorBusiness StudiesGlobal Perspectives, Cultures Languages
- Food ScienceAccelerated (UGRD to GRAD)MajorAgricultureSTEM (Science, Technology, Engineering, Mathematics)Agriculture, Food Systems, and Natural Resources
- Food Science and TechnologyMinorAgricultureSTEM (Science, Technology, Engineering, Mathematics)Techology InformationAgriculture, Food Systems, and Natural Resources
- Forensic ScienceMinorCommunicationEducation Human ServicesHealth Life SciencesHuman BehaviorNatural Physical SciencePlanning OrganizingSocial ScienceTechology InformationArts and Sciences
- Fraud InvestigationBusinessMinor
- Fundamentals of Computing & SecurityCertificateEngineeringNatural Physical ScienceTechology InformationCertificate - Online Delivery
- General Agricultural MajorMinorAgricultureBusiness StudiesPlanning OrganizingTechology InformationAgriculture, Food Systems, and Natural Resources
- Genomics, Phenomics, and BioinformaticsDoctoralMaster'sGraduate School and Interdisciplinary StudiesNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- GerontologyMinorHealth and Human ServicesEducation Human ServicesHealth Life SciencesHuman BehaviorSocial Science
- GerontologyDoctoralHealth and Human ServicesEducation Human ServicesHealth Life SciencesHuman Behavior
- GerontologyCertificateHealth and Human ServicesEducation Human ServicesHealth Life SciencesHuman BehaviorOnline (GRAD)
- GIS and Remote SensingCertificateAgricultureNatural Physical SciencePlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)Techology InformationArts and Sciences
- GIS and Remote SensingCertificateNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Techology InformationArts and Sciences
- Global BusinessBusinessMajorCommunicationBusiness StudiesGlobal Perspectives, Cultures Languages
- Global StudiesCertificateMajorMinorCommunicationArts HumanitiesGlobal Perspectives, Cultures LanguagesHealth Life SciencesSocial ScienceArts and SciencesMinor - Online Delivery
- Graduate Programs
- Health EducationMajorEducation Human ServicesHealth Life SciencesSocial ScienceArts and Sciences
- Health ServicesAccelerated (UGRD to GRAD)MajorHealth and Human ServicesEducation Human ServicesHealth Life Sciences
- Health, Nutrition and Exercise ScienceMaster'sHealth and Human ServicesEducation Human ServicesHealth Life SciencesHuman BehaviorOnline (GRAD)
- HistoryMajorMinorCommunicationArts HumanitiesDesign CreativityGlobal Perspectives, Cultures LanguagesSocial ChangeSocial ScienceArts and Sciences
- HistoryDoctoralMaster'sArts HumanitiesGlobal Perspectives, Cultures LanguagesSocial ScienceArts and Sciences
- Horticulture and Urban AgricultureAccelerated (UGRD to GRAD)MajorMinorAgricultureNatural Physical SciencePlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)Agriculture, Food Systems, and Natural Resources
- Horticulture and Urban Agriculture

- Hospitality & Tourism ManagementBusinessMinorCommunicationBusiness StudiesEducation Human ServicesPlanning OrganizingTechology InformationMinor - Online Delivery
- Human Development and Family ScienceAccelerated (UGRD to GRAD)MajorMinorHealth and Human ServicesEducation Human ServicesHealth Life SciencesHuman BehaviorSocial ScienceMajor - Online DeliveryMinor - Online Delivery
- Human Development and Family ScienceMaster'sHealth and Human ServicesEducation Human ServicesHealth Life SciencesHuman BehaviorOnline (GRAD)
- Industrial and Manufacturing EngineeringDoctoralMaster'sEngineeringPlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Industrial Engineering and ManagementAccelerated (UGRD to GRAD)MajorMinorEngineeringSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Information TechnologyMajorEngineeringPlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)Techology InformationMajor - Online Delivery
- Interior DesignMajorMinorCommunicationArts HumanitiesDesign CreativityGlobal Perspectives, Cultures LanguagesPlanning OrganizingArts and Sciences
- International AgribusinessMaster'sAgricultureCommunicationBusiness StudiesPlanning OrganizingAgriculture, Food Systems, and Natural Resources
- JournalismMajorMinorCommunicationArts HumanitiesDesign CreativityGlobal Perspectives, Cultures LanguagesHuman BehaviorPlanning OrganizingArts and Sciences
- Landscape ArchitectureMinorArts HumanitiesDesign CreativityGlobal Perspectives, Cultures LanguagesPlanning OrganizingTechology InformationArts and Sciences
- Landscape Architecture Master'sDesign CreativityArts and Sciences
- Large Animal Veterinary TechnologyMinorAgricultureNatural Physical ScienceAgriculture, Food Systems, and Natural Resources
- Leadership and Managerial SkillsCertificateBusinessCommunicationBusiness StudiesHuman BehaviorPlanning OrganizingOnline (GRAD)
- ManagementBusinessMajorCommunicationBusiness StudiesGlobal Perspectives, Cultures Languages
- Management CommunicationMajorMinorCommunicationBusiness StudiesGlobal Perspectives, Cultures LanguagesPlanning OrganizingArts and Sciences
- Management Information SystemsBusinessMajorMinorCommunicationBusiness StudiesGlobal Perspectives, Cultures Languages
- Managerial PsychologyMinorEducation Human ServicesHuman BehaviorSTEM (Science, Technology, Engineering, Mathematics)Arts and SciencesMinor - Online Delivery
- Manufacturing EngineeringMajorMinorEngineeringSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- MarketingBusinessMajorCommunicationBusiness StudiesPlanning OrganizingMajor - Online Delivery
- Materials and NanotechnologyDoctoralGraduate School and Interdisciplinary StudiesNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- MathematicsAccelerated (UGRD to GRAD)MajorMinorSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- MathematicsDoctoralMaster'sSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- Mathematics and PhysicsDual MajorsSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- Mathematics and StatisticsDual MajorsSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- Mathematics EducationMajorEducation Human ServicesSocial ScienceArts and Sciences
- MBA-AgribusinessMaster'sBusinessAgricultureCommunicationBusiness StudiesPlanning Organizing
- Mechanical EngineeringAccelerated (UGRD to GRAD)MajorEngineeringSTEM (Science, Technology, Engineering, Mathematics)Techology Information

- Mechanical EngineeringDoctoralMaster'sEngineeringSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Mechanical Engineering and PhysicsDual MajorsEngineeringDesign CreativityNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Medical Laboratory ScienceMajorHealth and Human ServicesHealth Life SciencesSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- MicrobiologyAccelerated (UGRD to GRAD)MajorMinorAgricultureHealth Life SciencesSTEM (Science, Technology, Engineering, Mathematics)Techology InformationArts and Sciences
- MicrobiologyDoctoralMaster'sAgricultureNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Agriculture, Food Systems, and Natural Resources
- Military ScienceMinorEngineeringNatural Physical SciencePlanning Organizing
- MusicMajorMinorCommunicationArts HumanitiesEducation Human ServicesGlobal Perspectives, Cultures LanguagesArts and Sciences
- MusicDoctoralMaster'sArts HumanitiesDesign CreativityOnline (GRAD)Arts and Sciences
- Music EducationMajorArts HumanitiesEducation Human ServicesSocial ScienceArts and Sciences
- Natural Resource SciencesDoctoralMaster'sAgricultureNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Online (GRAD)Agriculture, Food Systems, and Natural Resources
- Natural Resources ManagementAccelerated (UGRD to GRAD)MajorMinorAgricultureNatural Physical ScienceTechology InformationAgriculture, Food Systems, and Natural Resources
- NeuroscienceMinorHealth Life SciencesNatural Physical ScienceSocial ScienceSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- New Institutional Social ScienceCertificateBusinessAgricultureCommunicationEducation Human ServicesHealth Life SciencesPlanning OrganizingSocial Science
- NursingMajorHealth and Human ServicesEducation Human ServicesHealth Life SciencesMajor - Online Delivery
- NursingDoctoralHealth and Human ServicesHealth Life Sciences
- Nutrition ScienceAccelerated (UGRD to GRAD)MajorHealth and Human ServicesEducation Human ServicesHealth Life SciencesNatural Physical SciencePlanning OrganizingSocial ScienceSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Organizational Change Management
- Organizational LeadershipCertificateBusinessBusiness StudiesHuman BehaviorPlanning Organizing
- Pharmaceutical SciencesDoctoralHealth and Human ServicesHealth Life SciencesNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- PharmacyDoctoralMajorHealth and Human ServicesEducation Human ServicesHealth Life Sciences
- Philosophy, Ethics, and Applied HumanitiesMajorMinorCommunicationArts HumanitiesEducation Human ServicesHuman BehaviorSocial ScienceArts and Sciences
- Physical EducationMajorEducation Human ServicesHealth Life SciencesSocial ScienceArts and Sciences
- PhysicsAccelerated (UGRD to GRAD)MajorMinorNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- PhysicsDoctoralMaster'sNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- Physics EducationMajorEducation Human ServicesSocial ScienceArts and Sciences
- Plant PathologyDoctoralMaster'sAgricultureNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Agriculture, Food Systems, and Natural Resources
- Plant SciencesDoctoralMaster'sNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Agriculture, Food Systems, and Natural Resources

- Political ScienceAccelerated (UGRD to GRAD)MajorMinorSocial ScienceArts and Sciences
- Pre-LawMinorCommunicationArts HumanitiesEducation Human ServicesHuman BehaviorSocial ChangeSocial ScienceArts and Sciences
- Precision Agriculture Technology & ManagementMajorMinorAgricultureSTEM (Science, Technology, Engineering, Mathematics)Techology InformationAgriculture, Food Systems, and Natural Resources
- Private EnterpriseCertificateBusinessBusiness StudiesPlanning Organizing
- Professional EthicsCertificateMinorArts HumanitiesEducation Human ServicesHuman BehaviorSocial ChangeSocial ScienceArts and Sciences
- Professional SellingCertificateBusinessCommunicationBusiness StudiesEducation Human Services
- Professional WritingCertificateCommunicationArts HumanitiesDesign CreativityEducation Human ServicesPlanning OrganizingSocial ScienceArts and Sciences
- Professional WritingCertificateCommunicationArts HumanitiesBusiness StudiesDesign CreativitySocial ScienceArts and Sciences
- PsychologyAccelerated (UGRD to GRAD)MajorMinorEducation Human ServicesHealth Life SciencesHuman BehaviorArts and SciencesMinor - Online Delivery
- PsychologyDoctoralMaster'sHealth Life SciencesHuman BehaviorNatural Physical Science
- Public HealthCertificateMaster'sHealth and Human ServicesEducation Human ServicesHealth Life SciencesHuman BehaviorSTEM (Science, Technology, Engineering, Mathematics)Online (GRAD)
- Public HealthMinorHealth and Human ServicesEducation Human ServicesGlobal Perspectives, Cultures LanguagesHealth Life SciencesHuman BehaviorPlanning OrganizingSocial ChangeSocial Science
- Public HistoryMajorArts HumanitiesSocial ScienceArts and Sciences
- Public PolicyMinorCommunicationArts HumanitiesEducation Human ServicesGlobal Perspectives, Cultures LanguagesHealth Life SciencesHuman BehaviorPlanning OrganizingSocial ChangeSocial ScienceArts and Sciences
- Public PolicyMaster'sCommunicationEducation Human ServicesHuman BehaviorPlanning OrganizingSocial ScienceOnline (GRAD)
- PublishingCertificateCommunicationArts HumanitiesDesign CreativityEducation Human ServicesPlanning OrganizingSocial ChangeSocial ScienceArts and Sciences
- PublishingCertificateCommunicationArts HumanitiesBusiness StudiesDesign CreativityPlanning OrganizingArts and Sciences
- Radiologic SciencesMajorHealth and Human ServicesHealth Life SciencesTechology Information
- Range ScienceMinorAgricultureEducation Human ServicesNatural Physical SciencePlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)Techology InformationAgriculture, Food Systems, and Natural Resources
- Real Estate ValuationBusinessMinorBusiness StudiesPlanning Organizing
- ReligionMinorArts HumanitiesGlobal Perspectives, Cultures LanguagesSocial ScienceArts and Sciences
- Respiratory CareMajorHealth and Human ServicesEducation Human ServicesHealth Life Sciences
- Rhetoric, Writing and CultureDoctoralCommunicationArts HumanitiesSocial ScienceArts and Sciences
- RoboticsMinorEngineeringDesign CreativityHuman BehaviorPlanning OrganizingSocial ChangeSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Social Studies EducationMajorEducation Human ServicesSocial ScienceArts and Sciences
- Social Work & Human Development and Family ScienceDual MajorsMajorHealth and Human ServicesEducation Human ServicesGlobal Perspectives, Cultures LanguagesHuman BehaviorSocial ChangeSocial Science
- SociologyMajorMinorEducation Human ServicesSocial ScienceArts and Sciences
- SociologyMaster'sArts HumanitiesGlobal Perspectives, Cultures LanguagesHuman BehaviorSocial ScienceArts and Sciences
- Software DevelopmentCertificateEngineeringDesign CreativityNatural Physical SciencePlanning OrganizingTechology InformationCertificate - Online Delivery

- Software EngineeringCertificateMajorEngineeringNatural Physical ScienceSTEM (Science, Technology, Engineering, Mathematics)Techology InformationMajor - Online DeliveryCertificate - Online Delivery
- Software Engineering / Software and Security Engineering CertificateDoctoralMaster'sEngineeringDesign CreativitySTEM (Science, Technology, Engineering, Mathematics)Techology InformationOnline (GRAD)
- Soil ScienceMinorAgricultureEducation Human ServicesNatural Physical SciencePlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)Techology InformationAgriculture, Food Systems, and Natural Resources
- SpanishMajorMinorArts HumanitiesGlobal Perspectives, Cultures LanguagesSocial ScienceArts and Sciences
- Spanish EducationMajorArts HumanitiesEducation Human ServicesGlobal Perspectives, Cultures LanguagesSocial ScienceArts and Sciences
- Spanish StudiesMinorArts HumanitiesEducation Human ServicesGlobal Perspectives, Cultures LanguagesSocial ScienceArts and Sciences
- Sport CoachingCertificateDesign CreativityEducation Human ServicesHealth Life SciencesPlanning OrganizingArts and Sciences
- Sport ManagementAccelerated (UGRD to GRAD)MajorHealth and Human ServicesBusiness StudiesEducation Human ServicesHealth Life Sciences
- StatisticsMajorMinorPlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)Techology InformationArts and Sciences
- StatisticsCertificateDoctoralMaster'sSTEM (Science, Technology, Engineering, Mathematics)Arts and Sciences
- Strategic CommunicationMajorMinorCommunicationHealth Life SciencesArts and Sciences
- Student Affairs AdministrationCertificateCommunicationBusiness StudiesEducation Human ServicesHuman BehaviorPlanning OrganizingArts and Sciences
- Supply Chain ManagementCertificateMaster'sBusinessPlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)Techology InformationOnline (GRAD)
- Supply Chain ManagementBusinessMajorMinorCommunicationBusiness StudiesHuman BehaviorPlanning OrganizingTechology Information
- Theatre ArtsMajorMinorCommunicationArts HumanitiesDesign CreativityEducation Human ServicesGlobal Perspectives, Cultures LanguagesArts and Sciences
- Transportation & Supply ChainDoctoralBusinessPlanning OrganizingSTEM (Science, Technology, Engineering, Mathematics)Techology Information
- Tribal and Indigenous Peoples StudiesMinorEducation Human ServicesGlobal Perspectives, Cultures LanguagesArts and Sciences
- University StudiesMajorArts and SciencesMajor - Online Delivery
- Veterinary TechnologyMajorAgricultureHealth Life SciencesNatural Physical ScienceAgriculture, Food Systems, and Natural Resources
- Water ResourcesCertificateAgricultureNatural Physical SciencePlanning OrganizingAgriculture, Food Systems, and Natural Resources
- WellnessMinorHealth and Human ServicesHealth Life SciencesNatural Physical ScienceSocial Science
- Women and Gender StudiesMajorMinorArts HumanitiesDesign CreativityEducation Human ServicesGlobal Perspectives, Cultures LanguagesHuman BehaviorArts and Sciences
- Women and Gender StudiesCertificateArts HumanitiesEducation Human ServicesGlobal Perspectives, Cultures LanguagesHealth Life SciencesHuman BehaviorSocial ScienceArts and Sciences
- Youth DevelopmentCertificateHealth and Human ServicesEducation Human ServicesHuman BehaviorSocial ChangeOnline (GRAD)
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Undergraduate Programs of Study

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These program of study pages provide a summary overview of NDSU's various undergraduate majors, minors and certificate programs. Majors include a sample program guide for a 4-year program. The sample program guide is an informal curriculum offering a suggested sequence of courses by

semester. Sample program guides are intended to be flexible based on a number of individual student factors and should never replace the official curriculum. A link to the official curriculum is included in each overview.

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

A

Accounting (p. 130) M,m

Advertising and Design (p. 135) C

Aerospace Studies (p. 136) m

Aging Studies (p. 138) C

Agribusiness (p. 139)* M,m

Agricultural and Biosystems Engineering (p. 144)* M

Agricultural Communication (p. 150) M,m

Agricultural Economics (p. 154)* M

Agricultural Education (p. 159) M

Agricultural Sciences (p. 164) M

Animal Science (p. 170) M,m

Anthropology (p. 179) M,m

Apparel, Retail Merchandising and Design (p. 182) M,m,C

Architecture (p. 189) M

Art (p. 193) M,m

Art Education (p. 201) M

Artificial Intelligence (p. 204) m

B

Banking (p. 205) m

Behavioral Statistics (p. 206) M

Biochemistry and Molecular Biology (p. 210) M,m

Biological Sciences (p. 214)* M,m

Biological Sciences Education (p. 222) M

Biomedical Engineering (p. 226) m

Biotechnology (p. 227) M,m

Botany (p. 214) m

Business Administration (p. 234) M,m

Business Analytics (p. 240) C

Business Education (p. 240) M

C

Certificate of Completion: First-Year Spanish (p. 244) CC

Certificate of Completion: Second-Year Spanish (p. 245) CC

Certificate of Completion: Third-Year Spanish (p. 246) CC

Chemistry (p. 247) M,m

Chemistry Education (p. 255) M

Civil Engineering (p. 257)* M

Coatings and Polymeric Materials (p. 263)* m

Community Development (p. 265) m

Comprehensive Science Education (p. 266) M

Computer Engineering (p. 272)* M

Computer Science (p. 281)* M,m,C

Computer Science and Mathematics (p. 290) D

Computer Science and Physics (p. 293) D

Computer Science Foundations (p. 296) C

Computing Systems (p. 297) C

Construction Engineering (p. 298)* M

Construction Management (p. 303) M

Core Computer Science Competencies (p. 309) C

Creative Writing (p. 309) m

Criminal Justice (p. 311)* M,m

Crop and Weed Science (p. 315) M,m

Cultural Diversity (p. 321) m

Cybersecurity (p. 322) M,C

D

Data Science (p. 327) M, C

E

Economic Computation (p. 328) C

Economics (p. 329)* M,m

Electrical Engineering (p. 335)* M

Electrical Engineering & Physics (p. 344) D

Elementary Education & Human Development and Family Science (p. 348) (Dual Degree Program with Valley City State University) D

Emergency Management (p. 353) M,m

English (p. 358) M,m

English Education (p. 365) M

Entrepreneurship (p. 369) m, C

Environmental Design (p. 371) M

Environmental Engineering (p. 374) M

Equine Assisted Services (p. 380) m

Equine Science (p. 381) M,m

Event Management (p. 386) C

Exercise Science (p. 386) M

Extension Education (p. 391) m

F

Family and Consumer Sciences Education (p. 392) M

Family Financial Planning (p. 398) C

Finance (p. 398) M,C

Food Science (p. 403)* M

Food Science and Technology (p. 407) m

Forensic Science (p. 408) m

Fraud Investigation (p. 409) m

Fundamentals of Computing & Security (p. 410) C

G

General Agriculture (p. 411) m

Gerontology (p. 412) m

GIS and Remote Sensing (p. 413) C

Global Business (p. 414) M (2nd major only)

Global Studies (p. 416) M,m,C

H

Health Education (p. 423) M

Health Services (p. 428) M

History (p. 432) M,m

Horticulture and Urban Agriculture (p. 437) M,m

Hospitality & Tourism Management (p. 445) m

Human Development and Family Science (p. 446)* M,m

I

Industrial Engineering and Management (p. 454) M,m

Information Technology (p. 461) M

Interior Design (p. 464) M

J

Journalism (p. 468) M,m

L

Landscape Architecture (p. 472) m

Large Animal Veterinary Technology (p. 473) m

M

Management (p. 474) M

Management Communication (p. 479) M,m

Management Information Systems (p. 484) M,m

Managerial Psychology (p. 491) m

Manufacturing Engineering (p. 492) M,m

Marketing (p. 497) M

Mathematics (p. 502) M,m

Mathematics Education (p. 506) M

Mathematics and Computer Science (p. 290) D

Mathematics and Physics (p. 509) D

Mathematics and Statistics (p. 513) D

Mechanical Engineering (p. 519)* M

Mechanical Engineering and Physics (p. 524) D

Medical Laboratory Science (p. 527) M

Microbiology (p. 532) M,m

Military Science (p. 538) m

Music (p. 539) (BS/BA; BMUS) M,m

Music Education (p. 568) - Bachelor of Music programs (instrumental and vocal) M,m

N

Natural Resources Management (p. 581) M,m

Neuroscience (p. 590) m

Nursing (p. 597) M

Nutrition Science (p. 591) M

O

Organizational Leadership (p. 610) C

P

Pharmacy (p. 611) (includes the pre-pharmacy requirements and the B.S. in Pharmaceutical Sciences) M

Philosophy, Ethics, and Applied Humanities (p. 619) M, m

Physical Education (p. 624) M

Physics (p. 631)* M,m

Physics Education (p. 636) M

Physics and Computer Science (p. 293) D

Physics and Mathematics (p. 509) D

Political Science (p. 640) M,m

Precision Agriculture Technology & Management (p. 645) M,m

Pre-Law (p. 653) m

Private Enterprise (p. 654) C

Professional Ethics (p. 655) m, C

Professional Selling (p. 657) m, C

Professional Writing (p. 659) C

Psychology (p. 660) M,m

Public Health (p. 666) m

Public History (p. 667) M

Public Policy (p. 671) m

Publishing (p. 672) C

R

Radiologic Science (p. 673) M

Range Science (p. 677) m

Real Estate Valuation (p. 678) m

Religion (p. 679) m

Respiratory Care (p. 680) M

Robotics (p. 684) m

S

Social Studies Education (p. 686) M

Social Work & Human Development and Family Science (p. 691) (Dual Degree Program with Minot State University) D

Sociology (p. 695) M,m

Soil Science (p. 699) m

Software Development (p. 700) C

Software Engineering (p. 701) M,C

Spanish (p. 705) M,m

Spanish Education (p. 710) M

Spanish Studies (p. 714) m

Sport Coaching (p. 715) C

Sport Management (p. 715) M

Statistics (p. 720) M,m

Statistics and Mathematics (p. 513) D

Strategic Communication (p. 724) M,m

Supply Chain Management (p. 728) M,m

T

Theatre Arts (p. 733) M,m

Tribal and Indigenous Peoples Studies (p. 748) m

U

University Studies (p. 749) M

V

Veterinary Technology (p. 753) M

W

Water Resources (p. 757) C

Wellness (p. 758) m

Women and Gender Studies (p. 759) M,m

Z

Zoology (p. 214) m

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

Accounting

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/programs/undergraduate/ (http://www.ndsu.edu/business/programs/undergraduate/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/accounting/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/accounting/)

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

The Program

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

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

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

Career Opportunities

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

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

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

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

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

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

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

ACCOUNTING PRACTICUM (INTERNSHIP)

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

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

Selective Admission

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

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman					
Fall	**Credits**	**Spring**	**Credits**		
ENGL 110	3	COMM 110	3		
PSYC 111 or SOC 110	3	ENGL 120	3		
Gen Ed Humanities/Fine Arts & Cultural Diversity	3	MATH 144	4		
Free Elective	3	Gen Ed Science & Tech (w/ lab)	4		
Gen Ed Science & Tech	3	Gen Ed Wellness	2		
	15		**16**		
Sophomore					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
ACCT 200	3	ACCT 201	3	MRKT 320[2]	3
ECON 201	3	ECON 202	3	FIN 320[2]	3
TL 116	3	MGMT 320	3		
STAT 330	3	STAT 331	2		

PHIL 216	3	ACCT 311	4
Free Elective	1		
	16		**15**

Junior			
Fall	**Credits**	**Spring**	**Credits**
ACCT 320	3	BUSN 430	3
MIS 320	3	ACCT Practicum[1]	3
ACCT 312	4		
ENGL 320	3		
Free Elective	3		
	16		**6**

Senior			
Fall	**Credits**	**Spring**	**Credits**
ACCT 418	3	BUSN 489	3
300-400 Level CoB Elective	3	300-400 Level CoB Elective	3
300-400 Level Accounting Elective	3	ACCT 421	3
ACCT 420	3	300-400 Level Accounting Elective	3
Free Elective	3	Free Elective	3
	15		**15**

Total Credits: 120

1

Complete one of the following options: ACCT 413 Accounting Internship, ACCT 397 Fe/Coop Ed/Internship, UNIV 492 Global Practicum: Study Abroad, AGEC 371 Export Management, or MGMT 470 Entrepreneurship/Small Business Management.

2

Students who place out of ENG 110 may free up their schedule to replace a summer class with one in the fall or spring. Students may take an extra class in a fall or spring semester instead taking a summer class. The summer classes may be spread out to any summer session.

2

Accounting

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/programs/undergraduate/ (http://www.ndsu.edu/business/programs/undergraduate/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/accounting/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/accounting/#planofstudytext)

Degree Requirements

Major: Accounting

Degree Type: Bachelor of Science (B.S.)
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.

3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Accounting Requirements

Code	Title	Credits
Pre-Major Requirements		
COMM 110	Fundamentals of Public Speaking	3
ECON 201	Principles of Microeconomics	3
or ECON 202	Principles of Macroeconomics	
ENGL 120	College Composition II	3
MATH 144	Mathematics for Business	4
PSYC 111	Introduction to Psychology	3
or SOC 110	Introduction to Sociology	
Total Credits		**16**

Code	Title	Credits
Accounting Major Requirements		
ACCT 200	Elements of Accounting I [1]	3
ACCT 201	Elements of Accounting II [1]	3
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 420	Accounting Information Systems	3

ACCT 421	Auditing I	3
BUSN 430	Legal and Social Environment of Business [3]	3
BUSN 489	Strategic Management (Capstone Course) [3]	3
ECON 201	Principles of Microeconomics [2]	3
or ECON 202	Principles of Macroeconomics	
ENGL 320	Business and Professional Writing	3
FIN 320	Principles of Finance [3]	3
MGMT 320	Foundations of Management [3]	3
MRKT 320	Foundations of Marketing [3]	3
MIS 320	Management Information Systems [3]	3
PHIL 216	Business Ethics	3
TL 116	Business Software Applications	3
STAT 330	Introductory Statistics	3
STAT 331	Regression Analysis	2
Accounting Elective (ACCT Prefix) 300-400 Level		
Courses may be chosen from any 300-400 level accounting course with the exception of ACCT 397 and ACCT 413.		6
Accounting Elective Courses 300-400 Level		
Select courses from within the CoB prefixes of BUSN, FIN, MIS, MGMT, MRKT, and SCM. Courses numbered 394/494 require departmental approval. Includes courses cross-listed with CoB courses.		6
Accounting Practicum [4]		
Students must complete one of the following options:		3
ACCT 397	Fe/Coop Ed/Internship	
ACCT 413	Accounting Internship	
AGEC 371	Export Management	
MGMT 470	Entrepreneurship/Small Business Management	
UNIV 492		
Total Credits		**76**

1

ACCT 200 and 201 require a grade of B or better.

2

Take the other course not taken for the pre-major requirement.

3

Denotes Common Body of Knowledge (CBK) course.

4

Prerequisite for Accounting Practicum: ACCT 311 must be completed with a grade of C or better to take the accounting practicum.

Degree Requirements and Notes

- All courses for the pre-major and major require a grade of C or better.
- Students must earn a 2.50 institutional cumulative GPA to be admitted into the accounting major and to graduate with a degree.
- 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.
- The CoB accepts a maximum of up to (but not including) 50% of upper-division (300-level and 400-level) business courses[1] required for degree completion, with a minimum grade of C[2]. All transfer courses are subject to approval by the course discipline chair or designated representative.
  - [1]Defined as courses with the following prefixes: ACCT, BUSN, ENTR, FIN, MGMT, MIS, MRKT, SCM
  - [2]Credits that do not qualify for degree completion will still be accepted as general credits towards graduation, within the restrictions defined by university policy.
- A letter grade must be earned in any course that fulfills a major requirement (with the exception of some practicum options).
- 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.
- Students are not eligible to pursue a Business Administration minor 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.

Minor Requirements

Minor: Accounting

Required Credits: 19

Minor requirements

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

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

Minor Requirements and Notes

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

Advertising and Design Certificate

Department Information

- **Department Web Site:**
  www.ndsu.edu/communication/ (http://www.ndsu.edu/communication/)
- **Credential Offered:**
  Undergraduate Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/advertising-design/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/advertising-design/)

NDSU's interdisciplinary Advertising and Design Certificate allows students to customize their advertising education to meet industry trends by combining courses in Communication, Visual Arts, Retail, Business, and English. This certificate enhances a student's skills training for a career in integrated marketing communications, such as graphic design, advertising creative, advertising account planning, social media messaging, visual merchandising, and many other advertising and design-related fields.

Advertising and Design Certificate

Department Information

- **Department Web Site:**
  www.ndsu.edu/communication/ (http://www.ndsu.edu/communication/)
- **Credential Offered:**
  Undergraduate Certificate
- **Program Overview:**

catalog.ndsu.edu/programs-study/undergraduate/advertising-design/ (http://catalog.ndsu.edu/programs-study/undergraduate/advertising-design/)

Certificate Requirements

Advertising & Design Certificate

Minimum Required Credits: 12

Code	Title	Credits
Required Courses		
COMM 375	Principles of Strategic Communication	3
COMM 476	Advertising Campaign Practicum	3
Content Topics/Electives		**6**
Art		
ART 385	Advanced Topics in Graphic Design	
Business		
ENTR 201	Introduction to Entrepreneurship	
ENTR 301	Entrepreneurship Toolbox I	
MRKT 320	Foundations of Marketing	
MRKT 420	Advertising and Integrated Marketing Communication	
MRKT 465	Digital Marketing	
Communication		
COMM 376	Advertising Creative Strategies	
COMM 377	Media Planning	
COMM 470	Research for Strategic Communication	
English		
ENGL 229	Introduction to Creative Writing	
ENGL 322	Writing and the Creative Process	
ENGL 449	Usability and User Experience	
Retail		
ADHM 171	Fashion Dynamics	
ADHM 371	Fashion Trend Analysis and Forecasting	
ADHM 372	Global Retailing	
ADHM 373	Visual Merchandising and Promotion	
ADHM 425	Experiential Retailing	
Total Credits		**12**

Program Notes:

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

Aerospace Studies

Department Information

- **Department Web Site:**
  www.ndsu.edu/afrotc/ (http://www.ndsu.edu/afrotc/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/aerospace-studies/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/aerospace-studies/)

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

What is the Purpose of Air Force ROTC?

The AFROTC (Aerospace Studies) mission is to commission second lieutenants through the campus program offered at NDSU. Students enrolled in AFROTC earn college credits that can be used to fulfill elective requirements or to obtain a minor in Aerospace Studies. All full-time students (including graduate students) can pursue an Air Force or Space Force commission.

What is an Air Force or Space Force Commission?

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

Are You Interested in Flying?

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

Are You Interested in Space?

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

Does a Technical or Management Career Interest You?

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

The General Military Course

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

The Professional Officer Course

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

Scholarship Money?

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

Obligation?

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

Guaranteed Job/Salary/Benefits

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

- Highly competitive salary, starting at $55,000/year with guaranteed raises every two years
- Tax-free housing and food allowance
- 30 days of paid vacation a year
- unlimited, full pay sick leave

- full medical, dental and vision coverage at no cost
- competitive retirement package

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

Aerospace Studies

Department Information

- **Department Web Site:**
  www.ndsu.edu/afrotc/ (http://www.ndsu.edu/afrotc/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/aerospace-studies/ (http://catalog.ndsu.edu/programs-study/undergraduate/aerospace-studies/)

Minor Requirements

Minor: Aerospace Studies

Minimum Required Credits: 16

Code	Title	Credits
Required General Military Courses (Year 1-2)		
AS 111	Heritage and Values I	1
AS 112	Heritage and Values II	1
AS 211	Team and Leadership Fundamentals I	1
AS 212	Team and Leadership Fundamentals II	1
Required Professional Office Courses (Years 3-4)		
AS 321	Leading People and Effective Communication I	3
AS 322	Leading People and Effective Communication II	3
AS 441	National Security/Prep for Active Duty I	3
AS 442	National Security/Prep for Active Duty II	3
Total Credits		**16**

Minor Requirements and Notes

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

Aging Studies

Department Information

- **Department Web Site:**
  www.ndsu.edu/hdfs/ (http://www.ndsu.edu/hdfs/)
- **Credential Offered:**
  Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/aging-studies/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/aging-studies/)

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

Aging Studies

Department Information

- **Department Web Site:**
  www.ndsu.edu/hdfs/ (http://www.ndsu.edu/hdfs/)
- **Credential Offered:**
  Undergraduate Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/aging-studies/ (http://catalog.ndsu.edu/programs-study/undergraduate/aging-studies/)

Certificate Requirements

Aging Studies

Minimum Required Credits: 9

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

Agribusiness

Department Information

- **Department Web Site:**
  www.ndsu.edu/agecon/ (http://www.ndsu.edu/agecon/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/agribusiness/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/agribusiness/)

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

The Program

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

- Students are exposed to a range of concepts and methods useful in agribusiness decision-making in each of three areas of specialization: finance, management and marketing. Equally important, agribusiness graduates will master problem solving and effective communication skills to face challenges encountered in their professional careers. Agribusiness students will have the opportunity to take classes at NDSU's state-of-the-art commodity trading room and learn to utilize the room's information technologies.
- Agribusiness students are required to participate in an internship during their studies. Employers continue to place high importance on work-related experience when they evaluate potential employees. Employers know that all NDSU agribusiness graduates have gained valuable work experience through the required internship.
- Collaboration with the College of Business leads to concurrent satisfaction of a minor in one of the business fields. A minor in accounting, business administration, logistics management, or entrepreneurship is required.

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

Career Opportunities

Agribusiness graduates find career openings in many areas of specialization, including positions as international and domestic grain traders, elevator managers, sales representatives with chemical, seed, feed and fertilizer companies, analysts for railroads, transport and renewable energy companies, logistics managers, finance and credit officers, food company managers, experts with the foreign agriculture service, and analyst positions in market development organizations. In addition to a rewarding set of career opportunities following graduation, many students choose to continue with

graduate studies to further develop their analytical and management skills. Although many graduates find successful careers in North Dakota and Minnesota, others pursue careers throughout the nation and the world.

The Faculty

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

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

Financial Aid and Scholarships

Several $500 to $1,000 scholarships are available to outstanding freshmen entering the program each fall semester. Scholarships also are available to transfer students and students already in the agribusiness program at NDSU.

The department annually awards over $140,000 in scholarships (ranging from $500 to $12,000) to agribusiness and agricultural economics majors.

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

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

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
ECON 189		1	ENGL 120	3
ENGL 110		3	ECON 201	3
MATH 144		4	TL 116	3
Wellness Gen Ed		2	COMM 110	3
Hum/Fine Arts Gen Ed		3	Sci & Tech w/ Lab Gen Ed	4
Science & Tech Gen Ed		3		
		16		**16**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
AGEC 242		3	AGEC 244	3
ECON 202		3	AGEC 246	3
STAT 330		3	ECON 341	3
ACCT 200		3	ACCT 201	3
AGEC 339		3	STAT 331 or ECON 410	2
			Ag Science & Tech Major Elective	3
		15		**17**
Junior				
Fall	**Credits**		**Spring**	**Credits**
AGEC 339		3	AGEC 344	3
ECON 343		3	AGEC 346	3
COMM 212, 216, 308, 315, or 383		3	AGEC 397 (Internship)	2
Minor Course		3	Ag Science & Tech Major Elective	3

Hum & Fine Arts and Cultural Diversity Gen Ed	3	Minor Courses	6
	15		**17**

Senior			
Fall	**Credits**	**Spring**	**Credits**
AGEC 444, 446, or MGMT 320[2]	3	AGEC 445	3
Ag Science & Tech Major Elective	3	Minor Courses	6
Minor Courses	6	Area of Specialization Reequirement[2]	3
	12		**12**

Total Credits: 120

1

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

2

Area of specialization requires one core course plus one other course from the specialization for a total of 6 credits.

Agribusiness

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/agecon (http://www.ag.ndsu.edu/agecon/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/agribusiness/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/agribusiness/#planofstudytext)

Degree Requirements

Major: Agribusiness

Degree Type: Bachelor of Science (B.S.)
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

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

STAT 330	Introductory Statistics (May satisfy general education category R)	3
STAT 331	Regression Analysis	2 or 3
or ECON 410	Econometrics	
Minor Requirement		**16-24**
In addition to the requirements for the major in Agribusiness, students must complete a minor in Accounting (19 cr), Business Administration (24 cr), Entrepreneurship (16 cr), Logistics Management (19 cr), or Banking (18 cr).		
Total Credits		**88-99**

Areas of Specialization: Select one

Code	Title	Credits
Finance - 6 Credits		
AGEC 446	Agribusiness Finance	3
Select one of the following:		3
AGEC 347	Principles of Real Estate	
AGEC 356	Advanced Agricultural Lending	
AGEC 474	Cooperatives	
ECON 324	Money and Banking	
ECON 402	Economics of Entrepreneurship	
ECON 470	Public Economics	
Total Credits		**6**

Code	Title	Credits
Management - 6 Credits		
MGMT 320	Foundations of Management	3
Select one of the following:		3
AGEC 474	Cooperatives	
AGEC 375	Applied Agricultural Law	
AGEC 378	Introduction to Transportation & Logistics	
AGEC 472	Advanced Logistical Analysis	
ECON 402	Economics of Entrepreneurship	
ECON 472	International Trade	
Total Credits		**6**

Code	Title	Credits
Marketing - 6 Credits		
AGEC 444	Advanced Commodity Trading	3
Select one of the following:		3
AGEC 343	Introduction to Commodity Trading	
AGEC 350	Agrisales	
AGEC 474	Cooperatives	
AGEC 450 & AGEC 451	National AgriMarketing Association (NAMA) I and National AgriMarketing Association (NAMA) II	
ECON 402	Economics of Entrepreneurship	
ECON 472	International Trade	
Total Credits		**6**

1

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

Degree Requirements and Notes

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

Minor Requirements

Minor: Agribusiness

Required Credits: 18

Minor Requirements

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

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

Agricultural and Biosystems Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/aben/ (http://www.ndsu.edu/aben/)
- **Credential Offered:**
  B.S.A.B.En.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/agricultural-biosystems-engineering/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/agricultural-biosystems-engineering/)

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

- Machine Systems Engineering – for mechanical equipment and power units such as tractors and other equipment
- Process Engineering – for food, feed, fiber, biofuels, and other bioproducts
- Natural Resources and Environmental Systems Engineering – for soil, water, air, waste, and other areas
- General ABEN - encompasses a student-selected mix of the above areas

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

The Program

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

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

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

The Bachelor of Science in Agricultural and Biosystems Engineering program is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the commission's General Criteria and Program Criteria for Agricultural and Similarly Named Engineering Programs, and Program Criteria for Biological and Similarly Named Engineering Programs. .Agricultural and Biosystems engineering students are well-qualified for and encouraged to take the national Fundamentals of Engineering examination, which is the first step in the process of registration as a professional engineer.

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

Internships

Although not required by the curriculum, students are strongly encouraged to take advantage of paid internships, which allow students to spend a summer or, more typically, a summer and a semester doing engineering work. Students can earn up to 3 credits of engineering or program electives related to internships. There are also opportunities to work as a research assistant in projects conducted by faculty. The intern and research assistant positions help students gain hands-on experience in engineering and open doors for employment upon graduation.

Career Opportunities

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

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

- design, develop, test and manufacture agricultural power and machine systems;
- develop electrical and electronic applications for agricultural processing, and natural resources problems.
- convert bio-based resources to food, feed, fuel and other renewable products;
- design and manage irrigation, drainage, and agricultural waste management systems.

Graduates with an agricultural and biosystems engineering degree may also pursue an advanced degree in engineering, medicine, veterinary medicine, business, management or law.

Scholarships

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

Extra-Curricular Activities

Varied extracurricular programs are available to students majoring in Agricultural and Biosystems Engineering. Students are involved with the International ¼ Scale Tractor Student Design Competition, Bison Antique Tractor Club, and the Society of Women Engineers.

A Well-Equipped Teaching Facility

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

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
ABEN 110		3	ABEN 348	1
CHEM 121		3	ME 212	3
ENGL 110		3	ME 221	3
MATH 165		4	CHEM 122	3
BIOL 150, MICR 202, BIOL 111, or BIOL 124		3	ENGL 120	3
BIOL 150L, MICR 202L, or CHEM 121L		1	MATH 166	4
		17		**17**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
ABEN 255		3	ABEN 263	3
COMM 110		3	PHYS 252	4
ME 222		3	PHYS 252L	1
ME 223		3	MATH 266	3
MATH 259		3	ME 350	3
MATH 128		1	CSCI 122, ME 213, GEOG 455, or PAG 215	3
		16		**17**
Junior				
Fall	**Credits**		**Spring**	**Credits**
IME 460 or STAT 330		3	ABEN 391	1
CE 309 or ME 352		3	ABEN 444 or 452	3
ABEN 358		3	ABEN 482	3
ABEN 479		3	ABEN 484 or 464	3
Program Elective		3	ENGL 321 (ENGL 320, 321, 324, or 459)	3
			Gen Ed - Humanities/Fine Arts	3
		15		**16**
Senior				
Fall	**Credits**		**Spring**	**Credits**
ABEN 486		2	ABEN 487	2
IME 440		3	Program Elective	6
ENGR 327		3	Gen Ed - Social/Behav/Global	3
Gen Ed - Wellness		2	Gen Ed - Social/Behav	3
Program Elective		3		
Program Elective (300/400 Engr Elective)		3		
		16		**14**

Total Credits: 128

Agricultural and Biosystems Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/aben/ (http://www.ndsu.edu/aben/)
- **Credential Offered:**
  B.S.A.B.En.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/agricultural-biosystems-engineering/ (http://catalog.ndsu.edu/programs-study/undergraduate/agricultural-biosystems-engineering/)

Major Requirements

Major: Agricultural & Biosystems Engineering

Degree Type: B.S.A.B.En
Minimum Degree Credits to Graduate: 131

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

ABEN Core Requirements

Code	Title	Credits
ABEN 110	Introduction to Agricultural and Biosystems Engineering	3
ABEN 255	Computer Aided Analysis & Design	3
ABEN 263	Biological Materials Processing	3

ABEN 348	Agricultural Technology Exposition [1]	1
ABEN 358	Electric Energy Application in Agriculture	3
ABEN 391	Seminar	1
ABEN 444	Transport Processes	3
or ABEN 452	Bioenvironmental Systems Design	
ABEN 479	Fluid Power Systems Design	3
ABEN 482	Instrumentation & Measurements	3
ABEN 484	Drainage and Wetland Engineering	3
or ABEN 464	Resource Conservation and Irrigation Engineering	
ABEN 486	Design Project I	2
ABEN 487	Design Project II	2
BIOL 150	General Biology I	3
or BIOL 111	Concepts of Biology	
or BIOL 124	Environmental Science	
or MICR 202	Introductory Microbiology	
BIOL 150L	General Biology I Laboratory	1
or CHEM 121L	General Chemistry I Laboratory	
or MICR 202L	Introductory Microbiology Lab	
CHEM 121	General Chemistry I	3
CHEM 122	General Chemistry II	3
CE 309	Fluid Mechanics	3
or ME 352	Fluid Dynamics	
CSCI 122	Visual BASIC	3
or ME 213	Modeling of Engineering Systems	
or GEOG 455	Introduction to Geographic Information Systems	
or PAG 215	Mapping of Precision Ag Data	
ENGR 327	Ethics, Engineering, and Technology	3
IME 440	Engineering Economy	3
IME 460	Evaluation of Engineering Data	3
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
ME 212	Fundamentals of Visual Communication for Engineers	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
ME 350	Thermodynamics and Heat Transfer	3
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
Program Electives: Select from courses below. At least 3 of the 15 cr. must be upper-divison courses from the College of Engineering courses listed below with an "*".		15
ABEN 286	Introduction to Controlled Environment Agriculture (Natural Resource/General Focus)	
ABEN 377	Numerical Modeling in Agricultural and Biosystems Engineering (Machinery/Natural Resource/General Focus) [3]	
ABEN 456	Biobased Energy (Processing Focus) [3]	
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts (Processing/General Focus)	
ABEN 473	Agricultural Power (Machinery Focus)	
ABEN 496	Field Experience (All Focus Areas) [2]	
ABEN 478	Machinery Analysis & Design (Machinery Focus)	
ANSC 114	Introduction to Animal Sciences (Natural Resource Focus)	
ANSC 220	Livestock Production (Natural Resource Focus)	

ASM 264	Natural Resource Management Systems (Natural Resource Focus)
ASM 323	Post-Harvest Technology (Machinery/Processing Focus)
ASM 378	Machinery Principles and Management (Machinery Focus)
BME 220	Introduction to Biomedical Engineering (Processing Focus)
CFS 210	Introduction to Food Science and Technology (Processing Focus)
CFS 370	Food Processing I (Processing Focus)
CE 204	Surveying (Natural Resource Focus)
CE 316	Soil Mechanics (General Focus) [3]
CE 343	Structural Engineering and Analysis (General Focus) [3]
CE 408	Water Resources and Supply (Natural Resource Focus) [3]
CE 417	Slope Stability and Retaining Walls (General Focus) [3]
CE 421	Open Channel Flow (Natural Resource Focus) [3]
CE 446	Basic Dynamics of Structures (General Focus) [3]
CE 477	Applied Hydrology (Natural Resource Focus) [3]
CHEM 240	Survey of Organic Chemistry (Processing Focus)
ECE 275	Digital Design (Machinery Focus)
ECE 301 & ECE 306	Electrical Engineering I and Electrical Engineering Lab I (Machinery Focus) [3]
IME 330	Manufacturing Processes (Processing Focus) [3]
IME 335	Welding Technology (Machinery Focus) [3]
IME 456	Program and Project Management (All Focus Areas) [3]
ME 331	Materials Science and Engineering (Machinery Focus) [3]
ME 421	Theory of Vibrations (Machinery Focus) [3]
ME 435	Plastics and Polymer Processing in Manufacturing (Processing Focus) [3]
ME 442	Machine Design I (Machinery Focus) [3]
PAG 115	Introduction to Precision Agriculture (Machinery/Natural Resource Focus)
PAG 315	Electronic Systems in Precision Ag (Machinary Focus)
PAG 454	Applications of Precision Agriculture (Machinery Focus)
PLSC 110	World Food Crops (Processing/Natural Resource Focus)
PLSC 225	Principles of Crop Production (Processing/Natural Resource Focus)
SOIL 210	Introduction to Soil Science (Natural Resource Focus)
SOIL 410	Soils and Land Use (Natural Resource Focus)
Total Credits	**105**

1

ABEN 348 - AG Tech Exp (1 add'l cr.) may be used as a Program Elective.

2

ABEN 496 - Field Exp./Internship (1 - 3 cr.) may be used as a Program Elective. A maximum of three credits of ABEN 496 Field Exp./Internship may be counted towards degree requirements.

3

Students must select at least 3 cr. of upper-division College of Engineering courses to satisfy the 15 cr. Program Elective requirement.

Degree Requirements and Notes

SUGGESTED FOCUS AREAS: Consult with adviser when making selections.

- **Machinery Focus** - Select electives with emphasis on machine, power, robotic/autonomous, and electrical/electronic systems.
- **Natural Resource Focus** - Select electives with emphasis on areas that contribute to solving problems in environmental engineering, natural resources management, hydrology, irrigation, watershed management, and waste management.
- **Processing Focus** - 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.
- **General Focus** - Select electives from any of the above focus areas. Includes courses in structural and environmental aspects of agricultural facilities.

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

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

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

Agricultural Communication

Department Information

- **Department Web Site:**
  www.ndsu.edu/communication/ (http://www.ndsu.edu/communication/)
- **Credential Offered:**
  B.A.; B.S.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/agricultural-communication/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/agricultural-communication/)

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

Why Choose a Major in the Department of Communication?

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

You will get:

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

Agricultural Communication Major

The agricultural communication major combines the resources and expertise of two units, Communication and Agriculture, to produce trained communicators who can explain science, technologies, and complex agricultural issues to diverse audiences. Students will complete an applied capstone course in their final semester. Students majoring in agricultural communication may earn a Bachelor of Science degree (with a recommended minor in the College of Agriculture, Food Systems, and Natural Resources) or a Bachelor of Arts degree (with intermediate-level language proficiency).

Admission to the Major

Students are admitted to the agricultural communication major after completing 18 credits of pre-communication courses: COMM 110, COMM 112, COMM 114, COMM 212, COMM 220, and ENGL 120.

Internship Requirement

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

Career Opportunities

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

Extra-Curricular Activities

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

High School Preparation

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

Scholarships

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

The Faculty

Faculty members in the Department of Communication are dedicated teachers, scholars, and practitioners who are committed to providing high-quality courses, hands-on learning experiences, and opportunities for undergraduate research.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 101	1	COMM 110	3
COMM 112	3	COMM 114	3
COMM 133	3	ENGL 120	3
ENGL 110 (or placement into ENGL 120)	3	Humanities/Fine Arts/Cultural Diversity GE	3
Quantitative Reasoning GE	3	Science/Technology GE	3
Wellness GE	2	Science/Technology Lab GE	1
	15		**16**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 212	3	COMM 200	3
COMM 220	3	COMM 320	3
Minor Coursework	3	Minor Coursework	3
Global Perspectives GE	3	Humanities/Arts GE	3
Science/Technology GE	3	Science/Technology GE	3
	15		**15**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 310	3	COMM 362	3

COMM 496	3	Major Elective	3
Major Elective	3	Major Elective	3
Minor Coursework	3	Minor Coursework	3
Upper Division Writing	3	Free Elective	3
	15		**15**

Fourth Year

Fall	Credits	Spring	Credits
COMM 431	3	COMM 465	3
Major Elective	3	Major Elective	3
Minor Coursework	3	Minor Coursework	3
Free Elective	3	Minor Coursework	3
Free Elective	3	Free Elective	2
	15		**14**

Total Credits: 120

Agricultural Communication

Department Information

- **Department Web Site:**
  www.ndsu.edu/communication/ (http://www.ndsu.edu/communication/)
- **Credential Offered:**
  B.A.; B.S.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/agricultural-communication/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/agricultural-communication/#planofstudytext)

Major Requirements

Major: Agricultural Communication

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	

Upper Division Writing †	
Category R: Quantitative Reasoning †	**3**
Category S: Science and Technology †	**10**
Category A: Humanities and Fine Arts †	**6**
Category B: Social and Behavioral Sciences †	**6**
Category W: Wellness †	**2**
Category D: Cultural Diversity *†	
Category G: Global Perspectives *†	
Total Credits	**39**

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Pre-Communication Requirements		
Students must complete the following 18 credits of coursework to be admitted to the major.		
ENGL 120	College Composition II	3
COMM 110	Fundamentals of Public Speaking	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3
COMM 220	Persuasion	3
Agricultural Communication Major Requirements:		
COMM 101	Majors and Careers in Communication	1
COMM 133	Introduction to Agricultural Communication	3
COMM 200	Introduction to Media Writing	3
COMM 310	Advanced Media Writing	3
COMM 320	Communication Research Methods	3
COMM 362	Principles of Design For Media	3
COMM 431	Communication Ethics and Law	3
COMM 465	Convergence Media (Capstone)	3
COMM 496	Field Experience	3
Select one of the following for the upper division writing requirement:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 322	Writing and the Creative Process	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 326	Writing in the Design Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Electives:		
Select 15 credits from the following:		15
COMM 216	Intercultural Communication	
COMM 245	Introduction to Video Production	
COMM 308	Business and Professional Speaking	
COMM 313	Multimedia Editing	
COMM 330	Photography for the Media	

COMM 375	Principles of Strategic Communication	
COMM 445	Advanced Video Production	
COMM 450	Issues in Communication	
COMM 470	Research for Strategic Communication	
COMM 485	Risk and Crisis Communication	
AGEC 242	Introduction to Agricultural Management	
AGEC 244	Agricultural Marketing	
AGEC 350	Agrisales	
EMGT 101		
Minor Requirement:		**16**
Students are required to minor in Animal Science, Crop and Weed Science, Equine Science, Food Safety, Natural Resource Management, Range Science, or Soil Science.		
Total Credits		**77**

Minor Notes:

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

Minor Requirements

Minor: Agricultural Communication

Required Credits: 21

Minor Requirements

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

Minor Requirements and Notes

- Students must earn a minimum GPA of 2.75 in courses applied to the minor.
- A minimum of 9 credits must be taken at NDSU.

Agricultural Economics

Department Information

- **Department Web Site:**
  www.ndsu.edu/agecon/ (http://www.ndsu.edu/agecon/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**

catalog.ndsu.edu/undergraduate/program-curriculum/agricultural-economics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/agricultural-economics/)

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

The Program

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

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

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

The Faculty

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

Career Opportunities

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

Financial Aid and Scholarships

Several $500 to $1,000 scholarships are available to outstanding freshmen entering the program each fall semester. Scholarships also are available to transfer students and students already in the agribusiness program at North Dakota State University.

The department annually awards over $140,000 in scholarships (ranging from $500 to $12,000) to students majoring in agribusiness and agricultural economics.

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

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

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
ECON 189 or AGRI 150		1	ECON 201	3
ENGL 110		3	ENGL 120	3
MATH 144		4	TL 116	3
Science & Tech Gen Ed		3	COMM 110	3
Hum & Fine Arts Gen Ed		3	Sci & Tech w/ Lab Gen Ed	4
Wellness Gen Ed		2		
		16		**16**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
AGEC 242		3	AGEC 244	3
ECON 202		3	AGEC 246	3
STAT 330		3	STAT 331 or ECON 410	2
ACCT 102 or 200		3	ACCT 201 (or Free Elective if ACCT 102 was completed)	3
AGEC 339		3	Ag Science & Tech Major Elective	3
		15		**14**
Junior				
Fall	**Credits**		**Spring**	**Credits**
ECON 211		3	AGEC 342, 344, or 346	3
ECON 341		3	ECON 343	3
AGEC/ECON 300/400 Major Elective		3	AGEC/ECON 300/400 Major Elective	6
Hum & Fine Arts Gen ed		3	Ag Science & Tech Major Elective	3
Upper Level Writing Gen Ed		3		
		15		**15**
Senior				
Fall	**Credits**		**Spring**	**Credits**
AGEC 375 or 484		3	AGEC/ECON 300-400 Elective	3
AGEC 420, 444, 445, or 446 (Capstsone)		3	Ag Science & Tech Major Elective	3
COMM 212, 216, 308, 315, or 383		3	Free Electives	8
AGEC/ECON 300/400 Major Elective		3		
Free Elective		3		
		15		**14**

Total Credits: 120

[1]

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

Agricultural Economics

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/agecon (http://www.ag.ndsu.edu/agecon/)
- **Credential Offered:**

B.S.

- **Sample Program Guide:** catalog.ndsu.edu/programs-study/undergraduate/agricultural-economics/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/agricultural-economics/#planofstudytext)

Major Requirements

Major: Agricultural Economics

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Core Courses for Agricultural Economics		
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
AGEC 246	Introduction to Agricultural Finance	3
AGEC 339	Quantitative Methods & Decision Making	3
AGEC 375	Applied Agricultural Law	3

or AGEC 484	Agricultural Policy	
Select one from the following:		3
AGEC 342	Farm and Agribusiness Management II	
AGEC 344	Agricultural Price Analysis	
AGEC 346	Applied Risk Analysis	
Capstone: Select one from the following: [1]		3
AGEC 420	Integrated Farm and Ranch Management	
AGEC 444	Advanced Commodity Trading	
AGEC 445	Agribusiness Industrial Strategy	
AGEC 446	Agribusiness Finance	
AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take 150.) [2]	1
ECON 189	Skills for Academic Success	1
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
ECON 211	Introduction to Computational Economics	3
ECON 341	Intermediate Microeconomics	3
ECON 343	Intermediate Macroeconomics	3
MATH 144	Mathematics for Business (or any higher math)	4
STAT 330	Introductory Statistics	3
STAT 331	Regression Analysis	2-3
or ECON 410	Econometrics	
TL 116	Business Software Applications	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	
Select one communication course from the following:		3
COMM 212	Interpersonal Communication	
COMM 216	Intercultural Communication (May satisfy general education category B/D)	
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	
COMM 383	Organizational Communication I	
Agribusiness & Applied Economics Electives:		9
Select a minimum of 9 credits of 300-400 AGEC or ECON electives		
Agriculture Science & Technology: [3]		9
Complete 9 credits from 2 other areas in the College of AFSNR other than Agribusiness & Applied Economics. (This includes courses with the following prefixes: ASM, ANSC, ABEN, CFS, ENT, MICR, NRM, PPTH, PLSC, RNG, SOIL & VETS.)		
Total Credits		**74-78**

1

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

2

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

3

Exception to the 9 credits of Agriculture Science & Technology - Students do not need to complete these 9 credits if the student completes a minor from the College of Agriculture, Food Systems, and Natural Resources.

Degree Requirements and Notes

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

Agricultural Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/agricultural-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/agricultural-education/)

The agricultural education major has two pathways to prepare future educators:

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

B) **Training and Development Pathway** - prepares candidates to develop and deliver educational programming in corporate training settings, Extension, and non-profit organizations. Students will learn to work with youth and adults in diverse educational environments. This pathway and program is unique to North Dakota State University.

The Program

The agricultural education major is designed to combine general studies, preparation for effective teaching and learning, and a broad background in the various disciplines in agriculture. Courses in agricultural economics, agricultural systems management, animal and range science, plant sciences, horticulture, and soil science provide the necessary background in modern agriculture. A wide array of elective courses are also available in agriculture content areas.

Professional Education Courses

The Agricultural Education Teacher Licensure program is a collaboratively delivered program between the Department of Youth Development, Family, and Agricultural Education in the College of Agriculture, Food, Systems, and Natural Resources as well as the School of Education in the College of Arts and Sciences. Teacher candidates may enroll in the 200 and 300-level professional education courses (H&CE and EDUC) before being formally admitted to School of Education (SOE) coursework. Prior to enrolling in the 400-level EDUC courses, teacher candidates must complete the application for admission to the SOE. Requirements for admission can be found at the NDSU Teacher Education (https://www.ndsu.edu/ted/admission/undergraduate/) website.

Internship Capstones

Each of the pathways in Agricultural Education major require an internship as the capstone experience to the degree. In the Teacher Licensure Pathway, that internship is Student Teaching. During Student Teaching, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced agricultural educators in middle or secondary schools.

In the Training and Development Pathway, the internship is typically within the corporate setting or within an Extension setting. These candidates will also apply content and teaching and learning skills in their respective setting. They will develop and evaluate educational programming in a real-world setting, impacting the lives of others.

Student Advisement

Students are assigned to one of the faculty members in agricultural education who will work closely in program planning and in other ways to advise and assist them. Students are encouraged to seek their advisors' help whenever needed.

LICENSURE

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

Career Opportunities

Agriculture Teachers continue to be in high demand around the country. Most agricultural education teachers in North Dakota are on extended contracts and receive stipends for serving as an FFA advisor. The industry of agriculture is constantly looking for people with broad content knowledge and valuable people skills. No matter the pathway in Ag Ed, graduates will find themselves in high demand.

Ag Ed Society

The purpose of the Agricultural Education Society (https://myndsu.ndsu.edu/organization/ndsuagedsociety/) is to foster professional development, service, and community building among students, especially those in Agricultural and Extension Education. We aim to provide a place for students passionate for Agricultural Education to share their passion and grow professionally and personally.

Financial Aid and Scholarships

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

Sample Program Guide

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First Year				
Fall	**Credits**		**Spring**	**Credits**
ANSC 114		3	ANSC 223	2
ENGL 110		3	ASM 125	3
PLSC 110		3	CHEM 117 or 121	3
Gen Ed Social & Behavioral Science		3	CHEM 117L or 121L	1
Gen Ed Wellness		2	ENGL 120	3
			MATH 103	3
		14		**15**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
AGEC 242		3	EDUC 322	3
COMM 110		3	H&CE 232	3
EDUC 321		3	AGEC 244 or 350	3
PLSC 210		3	Gen Ed Hum/Fine Arts & Cult Div Gen Ed	3
PLSC 211		1	300 level PLSC Elective	3
BIOL Course plus Lab		4	Apply to the School of Education	
Complete Core Academic Skills test or access your ACT+ scores				
		17		**15**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
EDUC 451		3	EDUC 489	3
H&CE 467		3	H&CE 480	3
STAT 330		3	SOIL 210	3
ASM/ABEN Elective		3	ANSC Elective	3
Gen Ed Hum/Fine Arts Gen Ed		3	ASM/ABEN Elective	3
			Gen Ed Upper Division Writing	3
		15		**18**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
EDUC 486		3	H&CE 483	1

H&CE 481	3	H&CE 487	9
H&CE 446	3	H&CE 488	3
ANSC Elective	3		
Gen Ed Social & Behavioral Sciences	3		
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
	15		**13**

Total Credits: 122

Sample Program Guide

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First Year			
Fall	**Credits**	**Spring**	**Credits**
ANSC 114	3	CSCI 114	3
PLSC 110	3	ANSC 223	2
ENGL 110	3	ENGL 120	3
COMM 110	3	ASM 125	3
MATH 103	3	BIOL Course and Lab	4
	15		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CFS 210	3	H&CE 232	3
H&CE 446	3	AGEC 244 or 350	3
EDUC 322	3	SOIL 210	3
AGEC 242	3	CAFSNR Elective	3
STAT 330	3	Gen Ed Social & Behavioral Sciences	3
H&CE 196	1		
	16		**15**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 459	3	H&CE 445	3
PLSC 225	3	H&CE 196	1
EDUC 451	3	CAFSNR Electives	6
H&CE 467	3	Electives	3
Gen Ed Humanities & Fine Arts & Cultural Diversity	3		
Gen Ed Wellness	2		
	17		**13**
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
H&CE 196	1	H&CE 496 (Internship)	10

CAFSNR Electives	6	Gen Ed Social & Behavioral Sciences	3
Gen Ed Humanities & Fine Arts	3		
Electives	6		
	16		**13**

Total Credits: 120

Agricultural Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/agricultural-education/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/agricultural-education/#planofstudytext)

Major Requirements

Major: Agriculture Education

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Agriculture Education Core Requirements		
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
or AGEC 350	Agrisales	
ANSC 114	Introduction to Animal Sciences	3
ANSC 223	Introduction to Animal Nutrition	2
ASM 125	Fabrication & Construction Technology	3
Select one pair from the following:		4
BIOL 111 & BIOL 100L	Concepts of Biology and Non-Majors Biology Lab	
BIOL 124 & BIOL 100L	Environmental Science and Non-Majors Biology Lab	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
H&CE 232	Philosophy and Policy	3
PLSC 110	World Food Crops	3
SOIL 210	Introduction to Soil Science	3
STAT 330	Introductory Statistics	3
Select Pathway A or B		
Student must select Pathway A or B: A=Teacher Licensure; or B=Training and Development		46-59
Total Credits		**82-95**

Code	Title	Credits
Pathway A - Teacher Licensure Required Courses		
ASM or PAG Electives		6
ANSC Electives (200-400 level)		6
Select one CHEM pair:		4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1
PLSC Elective		3
IME 335	Welding Technology	3
EDUC 321	Introduction to Teaching	3
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
H&CE 444	Planning the Community Program in Agricultural Education	3
or H&CE 467	Leading Youth Organizations	
H&CE 480	Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education	3
H&CE 480L	STEM Teaching Methods in Agricultural Education Lab	1
H&CE 481	Methods of Teaching Agriculture	3

H&CE 481L	Methods of Teaching Agriculture Lab	1
H&CE 483	Student Teaching Seminar	1
H&CE 487	Student Teaching	9
H&CE 488	Applied Student Teaching	3
Total Credits		**59**

Code	Title	Credits
Pathway B - Training and Development Required Courses		
CFS 210	Introduction to Food Science and Technology	3
CSCI 114	Computer Applications	3
PLSC 225	Principles of Crop Production	3
H&CE 444	Planning the Community Program in Agricultural Education	3
or H&CE 467	Leading Youth Organizations	
H&CE 196	Field Experience	3
H&CE 445	Designing and Delivering Nonformal Education Programs	3
H&CE 446	Extension Education	3
H&CE 496	Field Experience	10
AFSNR Area Focus		
Select courses from the following prefixes: AGEC, AGRI, ANSC, ASM, NRM, PLSC, PAG, SOIL, VETS		15-18
Total Credits		**46-49**

Degree Requirements and Notes

- See the Agricultural Education website (https://www.ndsu.edu/programs/undergraduate/agricultural-education/) for admission requirements for the Ag Ed Teacher Certification pathway.
- Courses taken with a Pass/Fail grading basis may not be used to satisfy any degree requirement.
- A grade of 'C' or better is required in all required EDUC and H&CE courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required, as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.

Agricultural Sciences

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/academics/ (http://www.ag.ndsu.edu/academics/)
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/agricultural-sciences/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/agricultural-sciences/)

The Agricultural Sciences (Ag Sci) program is designed to serve students who wish to pursue a college education in the broad area of agriculture. The Ag Sci program allows students to tailor a degree to meet their career objectives in the broad Agriculture, Food Systems, and Natural Resources (AFSNR) industries. In addition, transfer students from two#year institutions find the greater flexibility of the Agricultural Sciences major useful in obtaining a bachelor's degree.

THE PROGRAM

Agricultural Sciences provides a broad-based program in Agriculture, Food Systems, and Natural Resources for students who wish to have a diversified program of study. In addition, the Agricultural Sciences Program can serve as an exploratory program for students who are undecided about the majors available in the College of Agriculture, Food Systems, and Natural Resources (https://www.ndsu.edu/agriculture/academics/academic-units/).

Students receive broad exposure to three, student-selected AFSNR emphasis areas from a choice of 10 emphases. The flexibility of the curriculum is a point of interest for many students. Several students transferring from two-year institutions have found that they could complete the requirements for a bachelor's degree in Agricultural Sciences more quickly than other majors.

ONLINE AVAILABILITY

Students can earn their BS in Ag Sci entirely online as well through a more prescribed curriculum. All credits can be earned at a distance.

FACULTY AND FACILITIES

Agricultural Sciences students are advised by faculty in the College of Agriculture, Food Systems and Natural Resources.

FINANCIAL AID AND SCHOLARSHIPS

Loans, scholarships, grants, and work-study are available through the Office of Financial Aid and Scholarships. Students requiring financial assistance should contact the Office of Financial Aid and Scholarships or One Stop directly. In addition, the College of Agriculture, Food Systems, and Natural Resources has several scholarships available for outstanding students based primarily on academic performance. Contact the Office of the Associate Dean, College of Agriculture, Food Systems, and Natural Resources for information and application forms.

EXTRA-CURRICULAR ACTIVITIES

Students are highly encouraged to become active members in at least one student organization, several of which are sponsored by the academic departments in the College of Agriculture, Food Systems, and Natural Resources.

CAREER OPPORTUNITIES

Employment opportunities for students in Agricultural Sciences remain strong and are similar to those of other production agriculture majors. Generally, the demand for graduates from the College of Agriculture, Food Systems, and Natural Resources exceeds the number of available graduates. Students can greatly enhance their employ-ability by obtaining at least one summer internship during their formal education.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
AGRI 189	1	ENGL 120	3
ENGL 110	3	COMM 110	3
MATH 103 (or higher level Math)	3	ANSC 114	3
AGRI 120	3	CHEM 117 or 121	3
BIOL 111 or 150	3	Gen Ed Social & Behavioral Science and Global Perspectives	3
		Gen Ed Wellness	2
	13		**17**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 114 or TL 116	3	STAT 330	3
ASM 115	3	SOIL 210	3
NRM 225	3	PLSC 110	3
ECON 201	3	Gen Ed Humanities & Fine Arts	3
Gen Ed Social & Behavioral Sci	3	Emphasis Area Course	3
	15		**15**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
Gen Ed Humanities and Fine Arts and Cultural Diversity	3	Agriculture Elective*	6
Gen Ed Upper Division Writing	3	Emphasis Area Courses	9

Emphasis Area Courses		9			
		15			**15**
Fourth Year					
Fall	**Credits**		**Spring**	**Credits**	
Emphasis Area Courses		9	H&CE 496 (Internship)		6
Elective 300/400 Level		6	Upper Division Emphasis Classes		9
		15			**15**

Total Credits: 120

Agricultural Sciences

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/academics/ (http://www.ag.ndsu.edu/academics/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/agricultural-sciences/ (http://catalog.ndsu.edu/programs-study/undergraduate/agricultural-sciences/)

Major Requirements

Major: Agricultural Sciences

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**
Category A: Humanities and Fine Arts †		**6**
Category B: Social and Behavioral Sciences †		**6**
Category W: Wellness †		**2**
Category D: Cultural Diversity *†		

Category G: Global Perspectives [*†]	
Total Credits	**39**

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Major Requirements for Agriculture Sciences		
AGRI 189		1
AGRI 120	Feeding and Fueling the World	3
ANSC 114	Introduction to Animal Sciences	3
ASM 115	Fundamentals of Agricultural Systems Management	3
BIOL 111	Concepts of Biology	3
or BIOL 150	General Biology I	
CSCI 114	Computer Applications	3
or TL 116	Business Software Applications	
CHEM 117	Chemical Concepts and Applications	3
or CHEM 121	General Chemistry I	
ECON 201	Principles of Microeconomics	3
H&CE 496	Field Experience	4
NRM 225	Natural Resources & Agrosystems	3
PLSC 110	World Food Crops	3
SOIL 210	Introduction to Soil Science	3
STAT 330	Introductory Statistics	3
Three Agriculture Sciences Emphasis Areas		
Student must select three (3) emphasis areas from the 10 areas offered below to complete the major. Each emphasis area is 12 credits and a minimum of 36 credits is required for the three areas. A minimum of six (6) credits in each emphasis area must be completed with courses numbered at the 300-400 level.		36
Total Credits		**74**

Code	Title	Credits
Agricultural Business and Economics Emphasis Area		
ECON 202	Principles of Macroeconomics	3
AGEC 242	Introduction to Agricultural Management	3
Select 6 credits from the following:		6
AGEC 244	Agricultural Marketing	
AGEC 246	Introduction to Agricultural Finance	
AGEC 342	Farm and Agribusiness Management II	
AGEC 343	Introduction to Commodity Trading	
AGEC 347	Principles of Real Estate	
AGEC 350	Agrisales	
AGEC 356	Advanced Agricultural Lending	
AGEC 474	Cooperatives	
ECON 343	Intermediate Macroeconomics	
ECON 402	Economics of Entrepreneurship	
Total Credits		**12**

Code	Title	Credits
Agricultural Systems Management Emphasis Area		
Select 12 credits from the following courses:		12

ASM 323	Post-Harvest Technology	
ASM 354	Electricity and Electronic Applications	
ASM 373	Tractors & Power Units	
ASM 374	Power Units Laboratory	
ASM 378	Machinery Principles and Management	
ASM 429	Hydraulic Power Principles and Applications	
ASM 475	Management of Agricultural Systems	
Total Credits		**12**

Code	Title	Credits
Animal Health Emphasis Area		
ANSC 218	Anatomy and Physiology of Domestic Animals	3
ANSC 219	Anatomy and Physiology Laboratory	1
ANSC 223	Introduction to Animal Nutrition	2
Select 6 credits from the following:		6
ANSC 260	Introduction to Equine Studies	
ANSC 300	Domestic Animal Behavior and Management	
ANSC 323	Fundamentals of Nutrition	
ANSC 324	Applied Animal Nutrition	
ANSC 357	Animal Genetics	
ANSC 370	Fundamentals/Animal Disease	
ANSC 371	Fundamentals of Animal Disease II	
Total Credits		**12**

Code	Title	Credits
Animal Production Emphasis Area		
ANSC 220	Livestock Production	3
ANSC 223	Introduction to Animal Nutrition	2
Select 7 credits from the following:		7
ANSC 230	Meat Grading and Evaluation	
ANSC 231	Livestock Evaluation	
ANSC 232	Dairy Cattle Evaluation	
ANSC 240	Meat Animal Evaluation and Marketing	
ANSC 241	Survey of Meat Science	
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 380	Livestock Sales and Marketing	
ANSC 440		
ANSC 463	Physiology of Reproduction	
ANSC 487	Growing and Finishing Cattle Management	
PLSC 315	Genetics	
Total Credits		**12**

Code	Title	Credits
Crop Production Emphasis Area		
PAG 115	Introduction to Precision Agriculture	2
Select 10 credits from the following:		10
PLSC 180	Plant Systems Approach to Global Foods	
PLSC 210	Horticulture Science	
PLSC 225	Principles of Crop Production	

PLSC 320	Integrated Forage and Cover Crops Production Management and Ecosystem Services
PLSC 335	Seed Technology & Production
PLSC 340	Grain Grading
PLSC 368	Plant Propagation
PLSC 386	Arboriculture Climbing and Rigging Operations
PLSC 415	Vegetable Crop Production
PLSC 422	Greenhouse Production and Management
PLSC 425	Potato Science
PLSC 485	Arboriculture Science
PAG 215	Mapping of Precision Ag Data
SOIL 322	Soil Fertility and Fertilizers
SOIL 465	Soil And Plant Analysis
Total Credits	**12**

Code	Title	Credits
Crop Protection Emphasis Area		
PPTH 324	Introductory Plant Pathology	3
ENT 350	General Entomology	3
Select 6 credits from the following:		6
PLSC 215	Weed Identification	
PLSC 323	Principles of Weed Science	
PLSC 453	Advanced Weed Science	
PPTH 454	Diseases Of Field and Forage Crops	
PPTH 455	Plant Disease Management	
Total Credits		**12**

Code	Title	Credits
Extension Education Emphasis Area		
H&CE 445	Designing and Delivering Nonformal Education Programs	3
H&CE 446	Extension Education	3
Select 6 credits from the following:		6
EDUC 322	Educational Psychology	
HDFS 462	Methods of Family Life Education	
H&CE 468	Foundations of Family and Consumer Sciences Education	
H&CE 480	Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education	
ENGL 459	Researching and Writing Grants and Proposal	
Total Credits		**12**

Code	Title	Credits
Landscape Production Emphasis Area		
PLSC 210	Horticulture Science	3
PLSC 368	Plant Propagation	3
Select 6 credits from the following:		6
PLSC 341	Landscape Bidding, Contracting and Operations	
PLSC 355	Woody Landscape Plants	
PLSC 365	Herbaceous Landscape Plants	
PLSC 370	Landscape Management	
PLSC 375	Turfgrass Management	
PLSC 381	Sports Turf Operations	
PLSC 386	Arboriculture Climbing and Rigging Operations	
PLSC 412	Nursery Production and Management	
PLSC 422	Greenhouse Production and Management	
PLSC 457	Horticulture and Turfgrass Systems	

PLSC 465	Advanced Landscape Plants	
PLSC 468	Landscape Irrigation Design	
PLSC 469	Landscape Irrigation Installation and Management	
PLSC 485	Arboriculture Science	
Total Credits		**12**

Code	Title	Credits
Natural Resources Emphasis Area		
SOIL 217	Introduction to Meteorology & Climatology	3
Select 9 credits from the following:		9
NRM 264	Natural Resource Management Systems	
NRM 401	Urban-Ecosystem Management	
NRM 402	River and Stream Resource Management	
NRM 420	Sustainable Scenarios in Natural Resources Management	
NRM 421	Environmental Outreach Methods	
NRM 431	National Environmental Policy Act and Environmental Impact Assessment	
NRM 453	Rangeland Resources Watershed Management	
NRM 454	Wetland Resources Management	
NRM 456	Ecological Restoration	
SOIL 264	Natural Resource Management Systems	
SOIL 410	Soils and Land Use	
Total Credits		**12**

Code	Title	Credits
Plant Food Production and Safety Emphasis Area		
MICR 100	Famine, Plague, and Cheese. Microbes: the cause and solution to the world's problems	3
MICR 453	Food Microbiology	2
Select 7 credits from the following:		7
ASM 323	Post-Harvest Technology	
CFS 370	Food Processing I	
CFS 450	Cereal Technology	
CFS 452	Food Laws and Regulations	
CFS 460	Food Chemistry	
CFS 462	Food Ingredient Technology	
CFS 472	Cereal and Food Fermentation	
CFS 473	Food Safety	
MICR 453L	Food Microbiology Laboratory	
Total Credits		**12**

Degree and Major Notes

- Courses cannot be used to fulfill more than one emphasis
- Classes offered in the emphasis may require additional prerequisites; consult an advisor to plan accordingly.
- Classes offered in the emphasis areas and electives may be offered on-campus only or available via distance education. See the semester schedule for a listing of online classes.

Animal Science

Department Information

- **Department Web Site:** www.ndsu.edu/agriculture/academics/academic-units/animal-sciences (http://www.ndsu.edu/agriculture/academics/academic-units/animal-sciences/)
- **Credential Offered:**

B.S.; Minor

- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/animal-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/animal-science/)

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

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

The Curriculum

Three study options are available for the animal science major.

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

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

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

High School Preparation

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

Career Opportunities

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

Extra-Curricular Activities

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

Financial Aid and Scholarships

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

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

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

This sample plan of study applies to the Animal Production, Management, and Husbandry study option.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
ANSC 101[1]		1	ANSC 240	3
ANSC 114		3	BIOL 111 & BIOL 100L[3]	4
CHEM 117 & 117L[2]		4	COMM 110	3
ENGL 110		3	ENGL 120	3
MATH 103		3	Gen Ed Humanities & Fine Arts and Cultural Diversity	3
Gen Ed Wellness		2		
		16		**16**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
AGEC 242		3	AGEC 244	3
ANSC 218		3	BIOC 260	4
ANSC 230, 231, or 232[4]		2	PLSC 315	3
ECON 201		3	STAT 330	3
MICR 202 & 202L		3	Gen Ed Humanities & Fine Art	3
		14		**16**
Junior				
Fall	**Credits**		**Spring**	**Credits**
ANSC 300		3	ANSC 324	3
ANSC 323		3	ANSC 340	3
ANSC 357		3	ANSC 380	2
ANSC 370		3	ANSC 463 & 463L	4
NRM/PLSC/RNG/SOIL Elective		3	Gen Ed Upper Division Writing	3
		15		**15**
Senior				
Fall	**Credits**		**Spring**	**Credits**
ANSC 379, 393, or 396[5]		2	ANSC 478	3
ANSC 482 or 488[6]		3	ANSC 480, 484, or 486[6]	3
Gen Ed Social & Behavioral Sciences		3	Electives	8
NRM/PLSC/RNG/SOIL Elective		3		
Elective		3		
		14		**14**

Total Credits: 120

1

ANSC 102 or VETS 101 are also accepted, but ANSC 101 is preferred for this option.

2

CHEM 117 and 117L can be replaced by CHEM 121 and 121L, respectively. If a student transfers in or takes CHEM 121 instead of CHEM 117, then CHEM 122 and CHEM 140 or 240 must be taken to ensure adequate pre-requisites for BIOC 260 are met.

3

BIOL 150 and BIOL 150L are also accepted, but BIOL 111 and BIOL 100L are preferred for this option.

4

ANSC 235 is also accepted, but requires additional pre-requisites not included on this plan of study.

5

ANSC 396 (Internship Experience) is recommended, but students can also take ANSC 379 (Global Seminar) or ANSC 393 (Undergraduate Research) experiences.

6

Two industry and production courses are required for this option. Fall course options include ANSC 482 and 488, whereas spring course options include ANSC 480, 484, and 486.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

This sample plan of study applies to the Biomedical Science option. This option is recommended for students interested in pursing a Doctor of Veterinary Medicine degree and/or students interested in graduate degree programs.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ANSC 102[1]	1	ANSC 114	3
ANSC 218	3	BIOL 151 & 151L	4
BIOL 150 & 150L	4	CHEM 122 & 122L	4
CHEM 121 & 121L	4	ENGL 110	3
MATH 103 or 105[2]	3	Gen Ed Wellness	2
	15		**16**
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ANSC 240	3	BIOC 260	4
ENGL 120	3	COMM 110	3
CHEM 341 & 341L[3]	4	ECON 201	3
MICR 350 & 350L	5	PLSC 315	3
		STAT 330	3
	15		**16**
Junior			
Fall	**Credits**	**Spring**	**Credits**
ANSC 300	3	ANSC 324	3
ANSC 323	3	ANSC 463 & 463L	4
ANSC 357	3	Gen Ed Upper Division Writing	3
PHYS 211 & 211L[4]	4	Biomedical Science Elective (e.g., CHEM 342)[4]	3
Gen Ed Humanities & Fine Arts and Cultural Diversity	3	Elective (e.g. PHYS 212)[4]	3
	16		**16**

Senior				
Fall	**Credits**		**Spring**	**Credits**
ANSC 379, 393, or 396[5]		2	ANSC 478	3
ANSC 444		3	ANSC 480, 484, or 486[6]	3
Gen Ed Social & Behavioral Sciences		3	Gen Ed Humanities & Fine Arts	3
Electives[4]		6	Elective[4]	3
		14		**12**

Total Credits: 120

1

ANSC 101 or VETS 101 are also accepted, but ANSC 102 is preferred for this option.

2

MATH 105, 107, or 146 are required to satisfy PHYS 211 pre-requisites and are accepted in place of MATH 103. The series suggests only MATH 105 is necessary to meet PHYS 211 pre-requisites, but MATH 107 and 146 are also accepted if transferred in or student is placed as eligible to take those courses. A student that does not place into MATH 105 or transfer in MATH 103 must start with MATH 103 to meet pre-requisite requirements of MATH 105.

3

CHEM 341L is not required for this option's degree plan, but is recommended as part of the CHEM 341 and 341L sequence to meet veterinary medicine school admission requirements. Students should review specific school requirements to determine if CHEM 341L and subsequent organic chemistry courses such as CHEM 342 and CHEM 342L are necessary.

4

PHYS 120 and PHYS 120L are also accepted, but do not satisfy veterinary medicine school admission requirements. PHYS 211 and PHYS 211L are therefore recommended for students pursuing admission to veterinary medicine schools, which impacts MATH requirements noted earlier. Additional courses may be needed to satisfy veterinary medicine schools, but are school specific. Students should review specific school admission requirements and use electives to meet those admission requirements if not required on this option's degree plan.

5

ANSC 396 (Internship Experience) is recommended, but students can also take ANSC 379 (Global Seminar) or ANSC 393 (Undergraduate Research) experiences.

6

One industry and production course is required for this option. Fall course options include ANSC 482 and 488, whereas spring course options include ANSC 480, 484, and 486.

Animal Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/agriculture/academics/academic-units/animal-sciences (http://www.ndsu.edu/agriculture/academics/academic-units/animal-sciences/)
- **Credential Offered:**
  B.S.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/animal-science/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/animal-science/#planofstudytext)

Major Requirements

Major: Animal Science

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.

4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Required Core Courses for Animal Science		
ANSC 114	Introduction to Animal Sciences	3
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
MATH 103	College Algebra	3
or MATH 105	Trigonometry	
or MATH 107	Precalculus	
or MATH 146	Applied Calculus I	
STAT 330	Introductory Statistics (May satisfy general education category R)	3
ANSC 218	Anatomy and Physiology of Domestic Animals	3
Select one of the following:		1
ANSC 101	Student Success Techniques - Animal and Equine Science	
ANSC 102	Student Success Techniques - Animal Sciences with Pre-Veterinary Medicine Emphasis	
ANSC 201	Student Success Techniques - Nontraditional & Transfer Students	
VETS 101	Student Success Techniques: Veterinary Technology	
ANSC 240	Meat Animal Evaluation and Marketing	3
ANSC 300	Domestic Animal Behavior and Management	3
ANSC 323	Fundamentals of Nutrition	3
ANSC 324	Applied Animal Nutrition	3
ANSC 463 & 463L	Physiology of Reproduction and Physiology of Reproduction Laboratory	4

ANSC 478	Research and Issues in Animal Agriculture	3
Select one of the following:		2
ANSC 379	Global Seminar	
ANSC 393	Undergraduate Research (research experience)	
ANSC 396	Field Experience (internship experience)	
Select one of the following:		3
ANSC 480	Equine Industry and Production Systems	
ANSC 482	Sheep Industry and Production Systems	
ANSC 484	Swine Production/Pork Industry Systems	
ANSC 486	Beef Industry and Production Systems	
ANSC 488	Dairy Industry and Production Systems	
Program Option		
Students must select one program option of interest to complete the major. 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.		44-48
Total Credits		**84-88**

Option 1: Animal Production, Management, & Husbandry Option (Standard)

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

Option 2: Animal Agribusiness Option

Code	Title	Credits
ACCT 102	Fundamentals of Accounting	3
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
AGEC 246	Introduction to Agricultural Finance	3
Select one from the following:		4
BIOL 111 & BIOL 100L	Concepts of Biology and Non-Majors Biology Lab (May satisfy general education category S)	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
Select one from the following:		4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy general education category S)	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	
Select one of the following evaluation courses:		2
ANSC 230	Meat Grading and Evaluation	
ANSC 231	Livestock Evaluation	
ANSC 232	Dairy Cattle Evaluation	
ANSC 235	Equine Evaluation	
ANSC 357	Animal Genetics	3
ANSC 380	Livestock Sales and Marketing	2
ECON 202	Principles of Macroeconomics (May satisfy general education category B)	3
PLSC 315	Genetics (May satisfy general education category S)	3
AGEC elective	300-400 level	6
Animal Agribusiness Electives (choose from 300+ level ANSC, AGEC, ECON, PLSC or RNG)		9
Total Credits		**48**

Option 3: Biomedical Science Option [1]

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

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

Biomedical Science Elective (choose from 300+ level ANSC, BIOC, BIOL, CHEM, MICR, PHYS OR ZOO)	3
Total Credits	**44**

1

Accelerated Undergraduate Animal Science Biomedical Sciences option to Master of Public Health Degree

- Students enrolled in the Biomedical Sciences option may participate in an accelerated undergraduate to graduate program (B.S. Animal Science degree to Master of Public Health degree).
- Students will complete and submit a required *Accelerated Degree Program Declaration* form identifying no more than 15 credits of graduate coursework to be counted towards their B.S. degree.
- A minimum 3.00 cumulative GPA must be maintained by students in the accelerated degree program.

Degree Requirements and Notes

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

Minor Requirements

Minor: Animal Science

Required Credits: 16

Minor Requirements

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

*

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

Minor Requirements and Notes:

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

Anthropology

Department Information

- **Department Web Site:**
  www.ndsu.edu/socanth/about/ (http://www.ndsu.edu/socanth/about/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/anthropology/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/anthropology/)

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

The Mission

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

Faculty

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

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

Laboratories

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

Field Schools/Internships

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

Career Opportunities

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

The Curriculum

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

Anthropology Club

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

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
ANTH 111		3	ANTH 204	3
SOC 110		3	ENGL 120	3
ENGL 110		3	Gen Ed Humanities/Fine Arts & Global Perspect	3
Gen Ed Science/Techonology and Lab		4	Gen Ed Wellness	2
			Free Elective	3
		13		**14**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
ANTH 205		3	COMM 110	3
ANTH 206		3	Minor or Language	3
Minor or Language		3	Gen Ed Science/Technology	3
Gen Ed Science/Technology		3	Free Elective	6
Free Elective		3		
		15		**15**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
Major Elective 300-400		3	Major Elective 300-400 Level	3
Major Elective 300-400		3	Minor or Language	3
Minor or Language		3	Gen Ed Upper Level Comm Writing	3
Free Elective		6	Gen Ed Quantitative Reasoning	3
			Free Elective	3
		15		**15**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
ANTH 471 or 481		3	ANTH 470 or 480	3
ANTH 494 or 496		1	Major Elective 300-400	3
Major Elective 300-400 level		3	Minor or Language	3
Minor or Language		3	Free Electives	8
Free Elective		6		
		16		**17**

Total Credits: 120

Anthropology

Department Information

- **Department Web Site:** www.ndsu.edu/socanth/about/ (http://www.ndsu.edu/socanth/about/)
- **Credential Offered:**

B.S.; B.A.; Minor

- **Sample Program Guide:** catalog.ndsu.edu/programs-study/undergraduate/anthropology/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/anthropology/#planofstudytext)

Major Requirements

Major: Anthropology

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Anthropology Core Requirements		
SOC 110	Introduction to Sociology [1]	3
ANTH 111	Introduction to Anthropology [1]	3
ANTH 204	Archaeology and Prehistory [1]	3
ANTH 205	Human Origins [1]	3
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	3

ANTH 298		1
ANTH 470	Theory in Archaeology [1, 2]	3
or ANTH 480	Development of Anthropological Theory	
ANTH 471	Archaeological Research Methods [1, 2]	3
or ANTH 481	Ethnographic Research Methods	
ANTH 494	Individual Study	1
or ANTH 496	Field Experience	
Major Electives 300-400 Level: [3]		15
Total Credits		**38**

1

Students must earn a 'C' or better in each of the Core Requirements courses to successfully complete their major requirements.

2

Other courses may qualify to substitute for the Theory and Methods courses. Substitutions must be approved by the adviser and department chairperson prior to course enrollment and paperwork must be filed with the Office of Registration and Records.

3

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 and a course substitution may need to be submitted to the Office of Registration and Records. These include internships, field schools, archaeology lab credits, etc.

Minor Requirements

Minor: Anthropology

Required Credits: 18

Code	Title	Credits
Required Courses		
ANTH 111	Introduction to Anthropology	3
SOC 110	Introduction to Sociology	3
Electives: Select two of the following:		6
ANTH 204	Archaeology and Prehistory	
ANTH 205	Human Origins	
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
Additional Electives		
Two anthropology courses at the 300-400 level		6
Total Credits		**18**

Minor Requirements and Notes

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

Apparel, Retail Merchandising and Design

Department Information

- **Department Web Site:**
  www.ndsu.edu/adhm/ (http://www.ndsu.edu/adhm/)
- **Credential Offered:**
  B.S.; B.A.; Minor; Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/apparel-retail-merchandising-design/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/apparel-retail-merchandising-design/)

Students majoring in apparel, retail merchandising and design choose one of the three options – Fashion Product Development, Fashion Entrepreneurship, and Retail Merchandising.

Students interested in design and product development would find the Fashion Product Development a great area of study. Graduates develop and deliver products to the global marketplace. This option focuses on developing, designing and marketing materials and products within the market and industry.

In the Fashion Entrepreneurship option, you will not only learn how to develop and sell products, you will also learn how to manage a successful business. Alumni from the program are using what they learned in the classroom to successfully run their own businesses.

New retail opportunities are emerging around the world today with digital retailing and retail technology. The course of study in the Retail Merchandising option includes classes on sourcing, buying, merchandising, promotion, and consumer behavior.

BACKGROUND INFORMATION

The world's textile and apparel industries are made up of companies that produce fibers, yarns, textiles and apparel, and accessory products for industrial, wholesale and individual consumers around the world. These industries are some of the largest and most productive in the world. Because of the size and nature of the textile and apparel industry, and their interconnection with many other industries, career opportunities are limitless. New retail opportunities are emerging around the world. National and global retailers provide goods and services to consumers, via multichannel retailing involving traditional stores, online venues, mobile apps, social networking sites, catalogs, and direct mail. Retailers use state-of-the-art technology to respond instantaneously to changing consumer demand from around the world. The dynamic environment in the retail industry provides many exciting opportunities for college graduates interested in the competitive, fast-paced field of retailing.

FLEXIBLE CURRICULUM

Three-year accelerated plans are available for all the three options. Two-year plans are available for transferred students who completed the general education requirements.

CAREER OPPORTUNITIES

Graduates hold positions as ***production developers, visual merchandisers, technical designers, buyers, sourcing specialists, social media marketing specialists, fashion forecasters, stylists, store managers,*** and ***interior merchandisers*** with such companies as ***Target, Kohl's, Scheels, Macy's, Merchology, Evereve, Best Buy, Nordstrom, The Gap, The Buckle, Evine Live, Nike, Forever 21, Old Navy,*** and ***Duluth Trading Company***, to name a few. Other graduates have used their skills to successfully run their own businesses.

OUR CONTACTS BEYOND COLLEGE WALLS

The apparel, retail merchandising and design program regularly plans travel and study programs to fashion, design and/or business centers. Off-campus study provides students contact with practicing professionals. Study tours to national and international destinations expose students to the fast pace of the changing global fashion and retail industry while allowing them to earn college credit. The program's affiliation with the Fashion Institute of Technology (FIT) in New York City permits NDSU students who qualify to earn credits as visiting students and to gain experience in the heart of the fashion business world. In addition, NDSU offers many study abroad programs in which students are encouraged to participate.

SCHOLARSHIPS

Several scholarships are designated for students majoring in apparel, retail merchandising and design; additional scholarships are available to all college majors.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Fashion Product Development Option

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ARMD 101	3	ARMD 155	3
ARMD 171	3	ARMD 181	3
CSCI 114 or TL 116	3	COMM 110	3
ENGL 110	3	ENGL 120	3
Wellness Gen Ed	2	ECON 105, 201, or 202	3
	14		**15**

Sophomore							
Fall	**Credits**		**Spring**	**Credits**			
ARMD 310		3	ARMD 203	3			
ARMD 366		3	ARMD 210	3			
ARMD 367		1	ARMD 371	3			
ART 122		3	CSCI 159 or STAT 330*	3			
PSYC 111		3	Science/Tech w/ Lab Gen Ed	4			
Science/Tech Gen Ed		3					
		16		**16**			
Junior							
Fall	**Credits**		**Spring**	**Credits**	**Summer**	**Credits**	
ARMD 375		1	ARMD 373	3	ARMD 496[3]		3
ARMD 385		3	ARMD 386	3			
ARMD 455		3	ARMD 472	3			
ARMD 489[2]		1	Free Electives	6			
ENGL 321 or 320		3					
Free Elective		3					
		14		**15**			**3**
Senior							
Fall	**Credits**		**Spring**	**Credits**			
Free Electives		15	ARMD 481	3			
			Free Electives	9			
		15		**12**			

Total Credits: 120

1

Prerequisites may apply.

2

Minimum 1 credit Study Tour in consultation with your advisor. Three-credit Study Tour is typically offered in Spring or Summer.

3

Offered in Spring, Summer and Fall.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Fashion ENTREPRENEURSHIP or Retail Merchandising Option

Freshman							
Fall	**Credits**		**Spring**	**Credits**			
ARMD 171		3	ARMD 181	3			
CSCI 114 or TL 116		3	COMM 110	3			
ENGL 110		3	ENGL 120	3			
PSYC 111		3	ECON 105, 201, or 202	3			
Wellness Gen Ed		2	Science/Tech Gen Ed	3			
		14		**15**			

Sophomore							
Fall	**Credits**		**Spring**	**Credits**			
ARMD 310		3	ARMD 203	3			
ARMD 366		3	ARMD 210	3			
ARMD 367		1	ARMD 371	3			
ARMD 385		3	ENTR 301 or 440 (or COMM or ART Elective)	3			
ART 122		3	Science/Tech w/ Lab Gen Ed	4			
ACCT 102, 200, or ENTR 201		3					
		16		**16**			
Junior							
Fall	**Credits**		**Spring**	**Credits**	**Summer**	**Credits**	
ARMD 372		3	ARMD 373	3	ARMD 496[3]		3-4
ARMD 375		1	ARMD 386	3			
ARMD 489[2]		1	ARMD 472	3			
MRKT 320 or ENTR 401		3	ENGL 321 or 320	3			
STAT 330 or CSCI 159[1]		3	MGMT 320 (or Free Elective)	3			
COMM or ART or ENTR Elective		3					
		14		**15**			**3-4**
Senior							
Fall	**Credits**		**Spring**	**Credits**			
MRKT 362 (or Free Elective)		3	ARMD 481	3			
MRKT 410		3	Free Elective	3			
Business Elective or Free Elective		3	Free Elective	3			
Free Elective		3	Free Elective	3			
Free Elective		3					
		15		**12**			

Total Credits: 120-121

1

Prerequisite may apply

2

Minimum 1 credit Study Tour in consultation with your advisor. Three-credit Study Tour is typically offered in Spring or Summer.

3

Offered in Spring, Summer and Fall.

Apparel, Retail Merchandising and Design

Department Information

- **Credential Offered:**
  B.S.; B.A.; Minor; UG Certificate
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/apparel-retail-mechandising-design/ (http://catalog.ndsu.edu/programs-study/undergraduate/apparel-retail-mechandising-design/)

Major Requirements

Major: Apparel, Retail Merchandising & Design

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

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Apparel, Retail Merchandising and Design Core Requirements		
ARMD 171	Fashion Dynamics	3
ARMD 181	Aesthetics and Visual Analysis of Apparel Products	3
ARMD 203	Sustainability and Social Change in Fashion	3
ARMD 210	Dress in World Cultures	3
ARMD 310	History of Fashion	3
ARMD 366	Textiles	3
ARMD 367	Textiles Laboratory	1
ARMD 371	Fashion Trend Analysis and Forecasting	3

ARMD 373	Visual Merchandising and Promotion	3
ARMD 375	Professional Development	1
ARMD 385	Global Fashion Economics	3
ARMD 386	Merchandise Planning and Buying	3
ARMD 472	Product Development	3
ARMD 481	Capstone in Apparel, Retail Merchandising and Design	3
ARMD 489	Study Tour	1-3
ARMD 496	Field Experience	3-4
ART 122	Studio Technology Foundations	3
CSCI 114	Computer Applications	3
or TL 116	Business Software Applications	
ECON 105	Elements of Economics	3
or ECON 201	Principles of Microeconomics	
or ECON 202	Principles of Macroeconomics	
PSYC 111	Introduction to Psychology	3
STAT 330	Introductory Statistics	3
or CSCI 159	Computer Science Problem Solving	
ENGL 321	Writing in the Technical Professions	3
or ENGL 320	Business and Professional Writing	
Option Requirement		
Select one option to complete the major: Retain Merchandising; Fashion Product Development; or Fashion Entrepreneurship		9-27
Total Credits		**69-90**

Code	Title	Credits
Retail Merchandising Option		
MRKT 372	Global Retailing	3
Select two courses from the following:		6
COMM 112	Understanding Media and Social Change	
COMM 200	Introduction to Media Writing	
COMM 260	Introduction to Web Design	
COMM 261	Introduction to Web Development	
COMM 375	Principles of Strategic Communication	
COMM 476	Advertising Campaign Practicum	
ART 180	Photography I	
ART 280	Digital Image and Output	
ART 385	Advanced Topics in Graphic Design	
Business minor is required		
ACCT 102	Fundamentals of Accounting	3
or ACCT 200	Elements of Accounting I	
MGMT 320	Foundations of Management	3
MRKT 320	Foundations of Marketing	3
MRKT 362	Foundations of Retailing	3
MRKT 410	Consumer Behavior	3
Select one from the following:		3
MRKT 420	Advertising and Integrated Marketing Communication	
MRKT 440	International Marketing	
MRKT 460	Marketing Strategy	
MRKT 465	Digital Marketing	
Total Credits		**27**

Code	Title	Credits
Fashion Product Development Option		
ARMD 101	Beginning Apparel Construction	3

ARMD 155	Apparel Construction and Fit	3
ARMD 455	Apparel Design and Assembly	3
Total Credits		**9**

Code	Title	Credits
Fashion Entrepreneurship Option		
MRKT 372	Global Retailing	3
Entrepreneurship minor is required.		
ENTR 201	Introduction to Entrepreneurship	3
ENTR 301	Entrepreneurship Toolbox I (If not taken above.)	3
or ENTR 440	International Entrepreneurship	
ENTR 401	Entrepreneurship Capstone	3
MRKT 465	Digital Marketing (If not taken above.)	3
or MGMT 451	Negotiations	
or ENTR 301	Entrepreneurship Toolbox I	
or ENTR 440	International Entrepreneurship	
Total Credits		**15**

Degree Requirements and Notes

- Transfer courses from other institutions must have grades of 'C' or better to be accepted for the program.
- Business minor requires an application to the College of Business and a minimum 2.5 GPA in courses used for the minor.

Minor Requirements

Minor: Apparel, Retail Merchandising & Design

Required Credits: 16

Code	Title	Credits
Required Courses		
ARMD 171	Fashion Dynamics	3
ARMD 366	Textiles	3
ARMD 367	Textiles Laboratory	1
Electives - Select 9 credits from the following:		9
ARMD 101	Beginning Apparel Construction	
ARMD 155	Apparel Construction and Fit	
ARMD 181	Aesthetics and Visual Analysis of Apparel Products	
ARMD 203	Sustainability and Social Change in Fashion	
ARMD 210	Dress in World Cultures	
ARMD 310	History of Fashion	
ARMD 371	Fashion Trend Analysis and Forecasting	
ARMD 372	Global Retailing	
or MRKT 372	Global Retailing	
ARMD 373	Visual Merchandising and Promotion	
ARMD 385	Global Fashion Economics	
ARMD 386	Merchandise Planning and Buying	
ARMD 455	Apparel Design and Assembly	
ARMD 472	Product Development	
ARMD 489	Study Tour	
Total Credits		**16**

Minor Requirements and Notes:

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

Certificate Requirements

Certificate: Apparel, Retail Merchandising & Design

Required Credits: 10

Certificate Requirements

Apparel, Retail Merchandising & Design

Required Credits: 10

Code	Title	Credits
ARMD 171	Fashion Dynamics	3
ARMD 366	Textiles	3
ARMD 367	Textiles Laboratory	1
Elective Courses: Select one from the following:		3
ARMD 101	Beginning Apparel Construction	
ARMD 203	Sustainability and Social Change in Fashion	
ARMD 210	Dress in World Cultures	
ARMD 371	Fashion Trend Analysis and Forecasting	
ARMD 372	Global Retailing	
or MRKT 372	Global Retailing	
ARMD 373	Visual Merchandising and Promotion	
ARMD 385	Global Fashion Economics	
ARMD 489	Study Tour	
Total Credits		**10**

Architecture

Department Information

- **Department Web Site:**
  www.ndsu.edu/architecture/ (http://www.ndsu.edu/architecture/)
- **Credential Offered:**
  B.S.Arch.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/architecture/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/architecture/)

Architecture is a fine art devoted to the design of the human environment. The architect is concerned with the aesthetic, social, environmental, technological and psychological factors that influence the design of a building. Architects are involved in the success, quality and appearance of a building within the context of a community and the city. Architecture is a dynamic profession that ranges from residential houses to large-scale urban buildings. An architect can design houses, commercial buildings, museums, college science buildings, and resorts, as well as many other building types.

BACKGROUND INFORMATION

To become an architect, you must learn to make use of science and technology, and develop sensitivity for beauty in the design of space and form with material. You must develop a deep understanding of people and their surroundings. Because this work encompasses so many different fields of interest, the architect is best thought of as a professional who bridges different areas of study and blends them into a single, significant activity.

CAREER OPPORTUNITIES

Architects work in architectural firms or accept positions with government, corporations or institutions. Some architects become highly specialized; others remain generalists in the profession, working on all facets of a project. Whichever path your career may follow, it is necessary to first build a firm background that includes essential architectural knowledge and skills. Architecture provides a variety of interesting positions within the discipline. One can either work for an established architecture firm or create their own business. There are three typical areas in architecture which one can focus on (or one can do all three) once they begin working. These three areas are: the design or aesthetic aspects of a project, the technical or material aspects of a project, or as the construction liaison when a project is being built. Further, architecture is a scalable profession depending on one's interests. For example, the possible areas one can work in range from small-scale residential houses to large-scale skyscrapers.

ACCREDITATION

The five-year Master of Architecture degree is fully accredited by the National Architectural Accreditation Board (NAAB). For more information see, www.naab.org/home. To become a licensed architect requires an accredited professional degree, completion of the Architectural Experience Program (AXP) and passing your state's licensing examination.

THE PROGRAM

The architecture program is a five-year professional course of study leading to a Master of Architecture degree. This degree is nationally accredited and recognized by all state architectural licensing boards. Students receive a Bachelor of Science in Architecture, a pre-professional degree, at the end of four years. During the first year of pre-architectural studies, the curriculum addresses the understanding of the environment and our impact on nature. In addition to meeting general education and departmental requirements, students take five environmental design courses (ENVD) comprised of lecture courses, a drawing course and a design fundamentals course. Beginning at the sophomore level, there is a selective admissions process where admitted students become architecture majors. We limit our studio courses to a maximum of 16 students to maintain a high level of student faculty contact. The program is a studio based model of education where students have high contact hours with their professors and learn problem solving techniques and design methodologies. The primary focus is on design thinking where students engage in individual and group projects that represent a vast array of design problems that require real-world solutions. Our primary focus is for students to learn to be great designers and leaders who engage the dynamic and emerging problems of the world with beautiful and thoughtful designs. Students will learn how to communicate their ideas through writing and public speaking in addition to traditional and new ways of thinking and communicating such as physical models, drawings, computer animation and renderings and virtual reality. The program has required field trips, a lecture series and invited outside professionals that help students focus on their own interests in architecture and create a project based on those interests.

ACTIVITIES AND FACILITIES

Activities within the department include:

- Student chapters of the American Institute of Architecture Students; Tau Sigma Delta; Freedom by Design; U.S. Green Building Council; National Organization of Minority Architects
- Yearly career fair
- Student-run Beaux Arts Ball with a guest speaker
- Interaction with community projects such as eFargo
- Studio field trips to U.S. cities
- Visiting lecturers who speak on architecture and related topics
- Joint studio projects with the landscape architecture program
- Semester-long term abroad option
- Summer study opportunities in Europe and North America and an International Student Exchange Program
- Spring break study abroad option
- Summer internship opportunities

Our facilities include:

- Two remarkable buildings located in downtown Fargo: Klai Hall and Renaissance Hall
- 3-D prototyping and printing
- 3-D computing rendering and server farm
- State-of-the-art computing labs
- Computer aided laser cutters and CNC
- Large document printers and scanners
- Software such as GIS, CAD and 3-D rendering and modeling
- An Architecture and Landscape Architecture Library of about 18,000 books, 70 magazine subscriptions and 36,000 slides
- Photographic and graphic reproduction equipment
- Individual studio spaces in the second through fifth years

HIGH SCHOOL PREPARATION

We suggest that students take high school courses in digital drawing and animation, an art class, such as drawing from life, and math and science courses such as calculus, trigonometry and physics. If possible, we encourage high school students to take advance placement or college credit courses that could be substitutes for North Dakota State University General Education requirements.

TRANSFER STUDENTS

Transfer applicants are required to enter the architecture program at the first-year level. Five years of study are required for completion of the degree. Advanced standing is possible through a portfolio and transcript review process.

SELECTIVE ADMISSION

Approximately 64 architecture majors are selected for admission into the second year of the program. A student's eligibility is based on their overall grade point average (GPA), their GPA for pre-architecture courses with the ENVD prefix, and a portfolio created in ENVD-172. It is important to apply early, complete all freshman courses in the first year and maintain a solid academic record. Students must have a minimum 3.0 GPA to apply to the graduate school during the third or fourth year of the program.

SPECIAL NOTICE

Students in the second year of the program will be required to purchase a laptop computer. Information on type of computer, software, purchase, and financing arrangements will be distributed to students prior to purchase.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENVD 101	3	ENVD 104	1
ENVD 102	1	ENVD 172	3
ENVD 130	3	ENGL 120	3
ENGL 110	3	COMM 110	3
ARCH 321	3	ARCH 322	3
PHYS 120	3	Gen Ed Quantitative Reasoning Requirement	3
		Gen Ed Wellness Requirement	2
	16		**18**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
ARCH 271	6	ARCH 272	6
ARCH 231	3	ARCH 232	3
Gen Ed Science & Tech Requirement	3	ARCH 344	3
Elective	3	PHIL Elective	3
PSYC 111	3	ARCH 323	3
	18		**18**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
ARCH 371	6	ARCH 372	6
ARCH 341	3	ARCH 450	3
ARCH 351	3	ARCH 454	3
ARCH 453	3	ARCH 461	3
Gen Ed Science & Tech Lab Requirement	1	ENGL 326, 357, or 320	3
	16		**18**
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
ARCH 471 or 474	6	ARCH 472	6
ANTH 111	3	Electives	3
Gen Ed Science & Tech Requirement	3	Electives	5

Electives	2	ARCH 443	3
SOC 110	3		
	17		**17**

Total Credits: 138

Architecture

Department Information

- **Department Web Site:**
  www.ndsu.edu/architecture/ (http://www.ndsu.edu/architecture/)
- **Credential Offered:**
  B.S. Arch.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/architecture/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/architecture/#planofstudytext)

Major Requirements

Major: Architecture

Degree Type: B.S.Arch
Minimum Degree Credits to Graduate: 138

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Code	Title	Credits
Architecture Requirements		
ANTH 111	Introduction to Anthropology (May satisfy general education category B and D)	3
ARCH 231	Creativity and Communication	3
ARCH 232	Design Technology	3
ARCH 233	Math for Designers	1
ARCH 271	Architectural Design I	6
ARCH 272	Architectural Design II	6
ARCH 321	History and Theory of Architecture I (May satisfy general education category A and G)	3
ARCH 322	History and Theory of Architecture II	3
ARCH 323	History and Theory of Architecture III	3
ARCH 341	Site Design for Architects	3
ARCH 344	Architectural Structures I	3
ARCH 351	Materials & Construction	3
ARCH 371	Architectural Design III	6
ARCH 372	Architectural Design IV	6
ARCH 443	Architectural Structures II	3
ARCH 450	Architectural Detailing	3
ARCH 453	Environmental Control Systems: Passive Principles	3
ARCH 454	Environmental Control System: Active System	3
ARCH 461	Urban Design	3
ARCH 471	Architectural Design V (Capstone)	6
ARCH 472	Architectural Design VI	6
or ARCH 474	International Design Studio	
Select one Upper Division Writing English from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 326	Writing in the Design Professions	
ENGL 357	Visual Culture and Language	
ENVD 101	Introduction to Environmental Design (May satisfy a general education category A)	3
ENVD 102	Drawing Basics for Environmental Designers	1
ENVD 104	Environmental Design Fundamentals	1
ENVD 130	Drawing Skills for Environmental Designers	3
ENVD 172	Environmental Design Fundamentals Studio	3
PHYS 120	Fundamentals of Physics (May satisfy general education category S)	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
Elective Requirements		
SOC 110	Introduction to Sociology (May satisfy general education category B)	3
PHIL Elective		3
Total Credits		**105**

Degree Requirements and Notes

- A grade of C or higher is required in all courses with an ARCH and ENVD prefix.
- If a student receives a grade of “D” or “F” in studio, he/she will be required to repeat the studio class the following year, before advancing to the next studio course.

Art

Department Information

- **Department Web Site:**
  www.ndsu.edu/visualarts/ (http://www.ndsu.edu/visualarts/)
- **Credential Offered:**
  B.S.; B.A.; B.F.A.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/art/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/art/)

The Department of Art and Design+ at North Dakota State University is part of the School of Design, Architecture and Art. The Department offers a broad range of degree programs from art emphasis areas in graphic design, painting, printmaking, ceramics, drawing, sculpture, photography and art education. Additionally the Department is home to the Apparel, Retail Management and Design program with many career opportunities available across the Department. It provides a wide range of courses with the philosophy that a strong foundation in the development of creative strategy, digital literacy, design ability, critical thinking and art/design historical awareness will prepare our students for careers in the creative economies.

THE PROGRAM

With a vibrant major and minor program, the Department of Art and Design+ brings together students from every college in the University. As a primary career specialization, or as a complement to another major field, art and design is one of the most versatile areas of study. Housed in one of the finest facilities in the upper Midwest for art and design, the department is home to ten professional artists/designers/scholars who teach every class we offer. We are an undergraduate program only, and are focused on the individual attention, modest class sizes and high quality advising for our undergraduate students.

THE FACILITIES

Renaissance Hall, a state-of-the-art facility located in downtown Fargo houses the Department of Art and Design. In addition, our facilities to support programs in Apparel, Retail Management and Design are housed in the Family Life Center on the main campus. Both provide well-equipped studio facilities. Our new digital media lab has been equipped with the most current output devices and the program has access to A second digital media studio, LAAVA Lab, provides a design thinking gathering space with high tech tools including CNC, 3D printing, 3D ceramic printing, laser cutting and virtual reality facilities. The print shop houses several etching and litho presses as well as facilities for letterpress and silkscreen printing. The ceramic student is well equipped with three gas kilns and a wood burning kiln, clay mixing facilities and 25 throwing wheels. The large sculpture studio houses various types of welders, a plasma cutter and other tools for metal work, woodworking and carving in stone. A high-tech classroom for art history seats 75 and is also available for smaller classes. The department has its own gallery in the Renaissance Hall and has a partnership with the Memorial Union Gallery on main campus. A wide range of exhibitions, including national traveling exhibitions, and student and faculty shows are always available on and off campus. In close proximity to the Plains Art Museum, the department and the Plains work closely together, enhancing art experiences for the entire region.

THE TEACHING COMMUNITY

Faculty are involved in their practices at local, regional and International levels with the approach that being engaged at a high level in production makes for better instruction. The art faculty prides itself in being very accessible to students at all times for individual consultation and critique.

PEARS PROGRAM

The Printmaking Education and Research Studio (PEARS) is the research arm of the Department. PEARS has transformed into a community research and printmaking advocacy studio. This program looks for ways to intersect the printmaking process across disciplines within the school and campus. Additionally PEARS serves the Land Grant mission of engagement with communities in a variety of ways through workshops and unique programming. The program also offers artist residencies, internships and studio rentals to qualified artists and promotes sales and exhibition of artwork produced in the studio.

CAREER OPPORTUNITIES

Art and Design students develop a range of skills from creative strategy to technical proficiency. These skills are broadly applicable to careers in many different disciplines. Potential careers include marketing, advertising, illustration, graphic design, user experience specialist, animation, arts marketing, art historian, commercial photography, museum and gallery work, exhibition design, art therapy, professional studio artist, municipal art programs, art criticism, independent art instruction, industrial design, art media research, arts organizations, retail merchandising, apparel design, store management along with university instruction and K-12 education.

THE CURRICULUM

With an early emphasis on technology and skills relevant in the 21st century, all students graduating from Visual Arts have a background in design. From this foundation, students select tracks including: K-12 education, graphic design/illustration, printmaking, painting, photography, ceramics, sculpture and drawing. The program offers a highly flexible and personal approach to each student's development. The middle of the program focuses on developing a portfolio strong enough to apply for the capstone experience which is either a three-credit or six-credit baccalaureate project and thesis exhibition during the senior year.

THE DEGREES

Students majoring in art have several degree options. The Bachelor of Fine Arts (BFA) is the professional degree requiring 76 hours in art with an emphasis in one or a combination of the following: graphic design, painting, ceramics, printmaking, sculpture, photography or drawing.

The Bachelor of Arts (BA) and the Bachelor of Science (BS) requires 59 hours in art with an emphasis in one of the following: graphic design, illustration, painting, ceramics, printmaking, sculpture, photography or drawing.

SCHOLARSHIPS

The multi-million dollar James Falck Endowment for Visual Arts is part of a new suite of scholarships for incoming freshman and existing visual arts majors. Scholarships are awarded based on academic excellence and portfolio review. For more information contact the NDSU Department of Visual Arts at (701) 231-8818 or email Kelly.Todd@ndsu.edu.

ART MINOR

The art minor is flexible with an emphasis on depth over breadth which serves to “compliment” a students major. This flexibility allows a student to choose a path that suits their educational goals. For instance, a graphic design emphasis in a student's minor program would be an ideal compliment to many fields, including marketing, advertising, business, architecture and engineering.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ART 122	3	ART 131	3
ART 124	3	Art 100 Level Studio	3
ART 210	3	ART 211	3
ENGL 110	3	ENGL 120	3
Gen Ed Soc & Behav Sci and Global Persp	3	Gen Ed Quantitative Reasoning	3
	15		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
Art 100 Level Studio	3	Art 100 Level Studio	3
Art 100 Level Studio	3	Art 100 Level Studio	3
ART 389	3	Minor Coursework	3
COMM 110 (C)	3	Gen Ed Science & Tech/Lab	4
Gen Ed Science & Technology	3		
	15		**13**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
Art 100 Level Studio	3	Art 300 Topics in Studio	3
Art 300 Topics in Studio	3	ART 491	1
ART 491	1	ART 335	3
ART 45X - Art History Rotation	3	ART 45X - Art History Rotation	3
Minor Coursework	3	Minor Coursework	3
Gen Ed Science & Tech	3	Free Elective	3
	16		**16**

Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
Studio: ART 420, 450, 470, 480, 485, 494		3	ART 489	3
Minor Coursework		6	Art 400 Level - Studio Emphasis	3
Upper Division Writing		3	Gen Ed Soc and Behav Sci & Cultural Diversity	3
Gen Ed Wellness		2	Minor Coursework	3
			Free Electives	4
		14		**16**

Total Credits: 120

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
ART 122		3	ART 131	3
ART 124		3	Art 100 Level Studio	3
ART 210 (A)		3	ART 185	3
ENGL 110 (C)		3	ART 211 (A)	3
Gen Ed Soc & Behav Sci and Cultural Diversity		3	ENGL 120 (C)	3
			* Foundations Portfolio Review	
		15		**15**

Second Year				
Fall	**Credits**		**Spring**	**Credits**
Art 100 Level Studio		3	ART 335	3
Art 300 Level - Topic Studio		3	Art 300 Level - Topic Studio	3
ART 391		1	ART 391	1
ART 389		3	ART 45X - Art History Rotation	3
Gen Ed Quantitative Reasoning		3	COMM 110 (C)	3
Gen Ed Science and Tech		3	Gen Ed Science and Tech	3
		16		**16**

Third Year				
Fall	**Credits**		**Spring**	**Credits**
Art 100 Level Studio - Choose from ART 120, 150, 160, 170, 180, & 185		3	Art 100 Level Studio	3
Art 300 Level - Topic Studio, Choose from ART 320, 350, 380, 385, & 390		3	Art 100 Level Studio	3
ART 491		1	Art 300 Level	3
ART 45X - Art History Rotation, Choose from ART 451, 452, & 453		3	ART 491	1
Gen Ed Science and Tech with Lab (S)		4	ART 45X - Art History Rotation	3

Gen Ed Wellness	2	Gen Ed Soc & Behav Sci and Global Perspectives	3
		*Apply for Baccalaureate	
	16		**16**

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
ART 400 Level - Emphasis Studio	3	ART 489	3
ART 489	3	ART 400 Level - Emphasis Studio	3
ART 45X - Art History Rotation	3	Free Elective	8
Gen Ed Upper Division Writing	3	*Capstone Exhibition 2	
*Capstone Exhibition 1			
	12		**14**

Total Credits: 120

Art

Department Information

- **Department Web Site:**
  www.ndsu.edu/visualarts/ (http://www.ndsu.edu/visualarts/)
- **Credential Offered:**
  B.S.; B.A.; B.F.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/art/ (http://catalog.ndsu.edu/programs-study/undergraduate/art/)

Major Requirements

Major: Art

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**

Category S: Science and Technology †	**10**
Category A: Humanities and Fine Arts †	**6**
Category B: Social and Behavioral Sciences †	**6**
Category W: Wellness †	**2**
Category D: Cultural Diversity *†	
Category G: Global Perspectives *†	
Total Credits	**39**

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Major Requirements		
Art History and Theory		
ART 210	Art History I (May satisfy general education category A)	3
ART 211	Art History II (May satisfy general education category A)	3
ART 389	Art Theory and Criticism	3
ART 452	Contemporary Art	3
ART 451	History of American Art	3
or ART 453	Topics in Art History	
Studio Foundations		
ART 122	Studio Technology Foundations	3
ART 124	Foundations of Design	3
ART 131	Foundations Drawing	3
Intro Studio Core		
ART 120	Painting I	3
ART 150	Ceramics I	3
ART 160	Sculpture I	3
ART 170	Printmaking I	3
ART 180	Photography I	3
ART 185	Graphic Design I	3
ART 335	Figure Drawing	3
Advanced Studio Development and Practice Core		
Students will take two 3 credit Advanced Studio Development courses with a 1 credit Studio Practice Seminar course.		
ART 390 & ART 491	Advanced Studio Arts Development and Seminar	4
ART 390 & ART 491	Advanced Studio Arts Development and Seminar	4
Baccalaureate Capstone		
Students must successfully complete a baccalaureate application with enough demonstrated depth in one or more areas to begin their Capstone. Once approved students take 3 credits of Baccalaureate Project and 3 credits of Baccalaureate Studio in the same semester.		
Baccalaureate Project		
ART 489	Baccalaureate Project	3
Baccalaureate Studio		3
ART 420	Baccalaureate Studio: Painting	
ART 450	Baccalaureate Studio: Ceramics	
ART 470	Baccalaureate Studio: Printmaking	
ART 480	Baccalaureate Studio: Photography	
ART 485	Baccalaureate Studio: Graphic Design	

ART 494	Individual Study *	
Total Credits		**59**

*
Mixed Media/Drawing/Sculpture Focus available on an individual basis. Please see department chairperson or advisor for permission.

Major Requirements

Major: Art

Degree Type: B.F.A.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Bachelor of Fine Arts in Art Requirements		
Art History and Theory		
ART 210	Art History I	3
ART 211	Art History II	3
ART 389	Art Theory and Criticism	3

ART 451	History of American Art	3
ART 452	Contemporary Art	3
ART 453	Topics in Art History	3
Studio Foundations		
ART 124	Foundations of Design	3
ART 122	Studio Technology Foundations	3
ART 131	Foundations Drawing	3
Intro Studio Core		
ART 120	Painting I	3
ART 150	Ceramics I	3
ART 160	Sculpture I	3
ART 170	Printmaking I	3
ART 180	Photography I	3
ART 185	Graphic Design I	3
ART 335	Figure Drawing	3
Advanced Studio Development and Practice Core		
Students will take four 3 credit Advanced Studio Development courses with a 1 credit Studio Practice Seminar course.		
ART 390 & ART 391	Advanced Studio Arts Development and Seminar	4
ART 390 & ART 391	Advanced Studio Arts Development and Seminar	4
ART 390 & ART 491	Advanced Studio Arts Development and Seminar	4
ART 390 & ART 491	Advanced Studio Arts Development and Seminar	4
Baccalaureate Capstone		
Students must successfully complete a baccalaureate application with enough demonstrated depth in one or more areas to begin their Capstone. Once approved students take 6 credits of Baccalaureate Project and 6 credits of Baccalaureate Studio courses over two consecutive semesters.		
Baccalaureate Project		
ART 489	Baccalaureate Project	6
Baccalaureate Studio		6
ART 485	Baccalaureate Studio: Graphic Design	
ART 480	Baccalaureate Studio: Photography	
ART 470	Baccalaureate Studio: Printmaking	
ART 450	Baccalaureate Studio: Ceramics	
ART 420	Baccalaureate Studio: Painting	
ART 494	Individual Study (Individual Study) *	
Total Credits		**76**

*
Mixed Media/Drawing/Sculpture Focus available on an individual basis. Please see department chairperson or advisor for permission.

Minor Requirements

Minor: Art

Required Credits: 18

Minor Requirements

Code	Title	Credits
Required Courses		
Art History/Art Appreciation Elective		**3**
Additional Art History/Studio Electives		**15**
Total Credits		**18**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- This minor is intended to provide maximum flexibility to serve as a compliment to ones major track and/or an opportunity to go deeply into one studio area.

Art Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/visualarts/ (http://www.ndsu.edu/visualarts/)
- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/art-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/art-education/)

Art Education is offered as a degree through the Department of Art and Design+ In collaboration with the NDSU School of Education. The program is led by Assistant Professor Eric Syvertson, who prior to NDSU was a 10+ year veteran teacher within the West Fargo School District. The mission of the Art Ed program is developing excellent K-12 artist-educators with a focus on professional practice, community engagement, technology integration and advocacy for the arts and design fields. Teacher candidates are prepared to teach and lead within and outside the school setting. Teacher candidates get the best of both worlds: content and studio courses with faculty in the department of Visual Arts and professional education courses from faculty in the School of Education (SOE). We develop excellent artists with a foundation to become impactful teachers. A minimum of 120 credit hours are needed for graduation.

STUDENT TEACHING

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

Licensure

Upon completing this program, teacher candidates are eligible for teacher licensure in Art in most states. Our program is accredited by the National Association of Schools of Art and Design, the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPB)

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
ART 122		3	ART 131	3
ART 124		3	Art 100 Level Studio	3
ART 210 (A)		3	ART 211 (A)	3
ENGL 110 (C)		3	ENGL 120 (C)	3
Gen Ed Soc and Behav Sci & Global Perspectives		3	Gen Ed Quantiative Reasoning	3
			Foundations Portfolio Review	
		15		**15**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
Art 100 Level Studio		3	Art 100 Level Studio	3
Art 100 Level Studio		3	Art 100 Level Studio	3

ART 389	3	EDUC 322	3
EDUC 321	3	Gen Ed Science and Tech with Lab	4
COMM 110 (C)	3	Gen Ed Soc & Behav Sci and Cultural Diversity	3
Gen Ed Wellness	2	Apply to School of Education	
Complete Core Academic Skills Exam or access your ACT+ scores			
	17		**16**

Third Year

Fall	Credits	Spring	Credits
Art 100 Level Studio	3	Art 300 Topics in Studio	3
Art 300 Topics in Studio	3	ART 491	1
ART 491	1	ART 335	3
ART 45X - Art History Rotation		ART 45X - Art History Rotation	3
Gen Ed Science and Tech	3	EDUC 481	3
EDUC 451	3	EDUC 489	3
EDUC 475	2	Apply for Baccalaureate Capstone	
	15		**16**

Fourth Year

Fall	Credits	Spring	Credits
EDUC 482	3	EDUC 485	1
EDUC 486	3	EDUC 487	9
ART 489	3	EDUC 488	3
ART 400 Level - Studio Emphasis	3	Gen Ed Upper Division Writing	3
Gen Ed Science & Tech	3		
Capstone Exhibition			
Apply to Student Teach (Meeting TBA)			
Complete Praxis Subject Assessment and PLT exams			
	15		**16**

Total Credits: 125

Art Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/visualarts/ (http://www.ndsu.edu/visualarts/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/art-education/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/art-education/#planofstudytext)

Major Requirements

Major: Art Education

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
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 210	Art History I (May satisfy general education category A)	3
ART 211	Art History II (May satisfy general education category A)	3

ART 389	Art Theory and Criticism	3
ART 451	History of American Art	3
or ART 453	Topics in Art History	
ART 452	Contemporary Art	3
Studies in Studio		
ART 120	Painting I	3
ART 122	Studio Technology Foundations	3
ART 124	Foundations of Design	3
ART 131	Foundations Drawing	3
ART 150	Ceramics I	3
ART 160	Sculpture I	3
ART 170	Printmaking I	3
ART 180	Photography I	3
ART 185	Graphic Design I	3
ART 335	Figure Drawing	3
Advanced Studio Development and Seminar		
Students must take 6 credits from the following with enough depth to develop a thesis		
ART 390 & ART 491	Advanced Studio Arts Development and Seminar	4
ART 390 & ART 491	Advanced Studio Arts Development and Seminar	4
Baccalaureate Project		
One Studio Course from the following list must be taken with ART 489.		
ART 489 & ART 420	Baccalaureate Project and Baccalaureate Studio: Painting (Capstone)	3
or ART 430	Drawing IV	
or ART 435	Advanced Figure Drawing	
or ART 450	Baccalaureate Studio: Ceramics	
or ART 460	Sculpture IV	
or ART 470	Baccalaureate Studio: Printmaking	
or ART 480	Baccalaureate Studio: Photography	
or ART 485	Baccalaureate Studio: Graphic Design	
Total Credits		**90**

Degree Requirements and Notes

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

Artificial Intelligence

Department Information

- **Department Web Site:**
  https://www.ndsu.edu/cs/
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/artificial-intelligence/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/artificial-intelligence/)

This minor will allow students to deepen their understanding of Artificial Intelligence. The program is designed to be relevant to students in any major. It is laid out to include a concise coverage of mathematical and computational foundations, a specific course on artificial intelligence, and an elective that can be drawn from courses offered in the computer science department or any of the other departments that have broadened their machine learning and artificial intelligence offerings in recent years.

Artificial Intelligence

Department Information

- **Department Web Site:**
  https://www.ndsu.edu/cs/
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/artificial-intelligence/ (http://catalog.ndsu.edu/programs-study/undergraduate/artificial-intelligence/)

Minor Requirements

Artificial Intelligence

Minimum Credits Required: 19

Code	Title	Credits
Required Courses		
Select one from the following:		4 or 6
CSCI 160	Computer Science I	
CSCI 227 & CSCI 228	Computing Fundamentals in Python I and Computing Fundamentals in Python II	
CSCI 222	Discrete Mathematics	3
or MATH 270	Introduction to Abstract Mathematics	
CSCI 372	Comparative Programming Languages	3
or CSCI 312	Survey of Programming Languages	
CSCI 426	Introduction to Artificial Intelligence	3
Additional Electives - select 6 credits from the following:		6
CSCI 420	Introduction to Data Science in Python	
CSCI 422	Fundamentals of Data Engineering	
CSCI 425	Machine Learning	
CSCI 428	Artificial Intelligence, Ethics, and the Environment	
CSCI 485	Autonomous Command and Artificial Intelligence for Robots and Other Cyber-Physical Systems	
ECE 477	Hardware Design for Machine Learning	
IME 465	Introduction to Machine Learning	
Total Credits		**19-21**

Minor Requirements and Notes:

- A grade of C is required in all courses for the AI minor.
- A minimum of 8 credits must be completed at NDSU
- Cannot be declared with the Standard track or the Data Science track of the B.S. in Computer Science.

Banking

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  Minor

- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/banking/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/banking/)

Banks are the lifeblood of the economy. Today's commercial banks are more diverse than ever. Therefore there is a tremendous range of employment opportunities in this sector, starting at the branch level as a bank teller to a wide variety of other positions such as the credit analyst, personal banker, loan officer, mortgage originator, and so forth. As of December 2022, over 29,000 banking jobs are available nationwide on O*Net.com. Median salary in North Dakota is $77, 000 and in Minnesota is $79,000. Banks are actively recruiting management talent, especially in small and mid-sized towns.

Banking

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/banking/ (http://catalog.ndsu.edu/programs-study/undergraduate/banking/)

Minor Requirements

Minor: Banking

Required Credits: 18

Minor Requirements

Code	Title	Credits
ECON 105	Elements of Economics	3
or ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	3
FIN 320	Principles of Finance	3
FIN 430	Management of Financial Institutions	3
FIN 450	Advanced Bank Management	3
FIN 451	Credit Analysis	3
Total Credits		**18**

Notes:

- A minimum of eight credits must be earned in residence at NDSU.

Behavioral Statistics

Department Information

- **Department Web Site:**
  www.ndsu.edu/statistics/ (http://www.ndsu.edu/statistics/)
- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/behavioral-statistics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/behavioral-statistics/)

This major is a joint effort between the Department of Statistics (https://www.ndsu.edu/statistics/) and the Department of Psychology (https://www.ndsu.edu/psychology/). It is recommended that a student wishing to obtain a degree in Behavioral Statistics consult with an advisor in both departments. This major prepares students for careers involving collecting and analyzing data on human behavior, for example, in medical care, insurance, market research, or health, educational and social services. Graduates of this program are expected to have good quantitative reasoning skills and to have strong people skills. ***Note:*** *this curriculum also fulfills requirements for the major in Psychology.*

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as,

but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110		3	ENGL 120	3
MATH 103 (or higher level)		3	SOC 110	3
PSYC 111		3	BIOL 126	3
ANTH 111		3	Science Lab Gen Ed	1
CSCI 114 or TL 116		3	Hum/FA & Global Perspective Gen Ed	3
			Free Elective	3
		15		**16**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
STAT 330		3	STAT 331	2
PSYC 350		3	PSYC 351	3
BIOL 126		3	COMM 110	3
Science & Technology Gen Ed		3	Humanities & Fine Arts Gen Ed	3
Wellness Gen Ed		2	Free Elective	4
		14		**15**
Junior				
Fall	**Credits**		**Spring**	**Credits**
PSYC 200- 400 Level Elective		3	STAT 460, 463, 469, or 472[2]	3
PSYC 200- 400 Level Elective		3	PSY Behavioral (Choose from Group A-D)	3
PSY Behavioral (Choose from Group A-D)		3	PSY Behavioral (Choose from Group A-D)	3
Free Elective		6	Free Elective	6
		15		**15**
Senior				
Fall	**Credits**		**Spring**	**Credits**
STAT 471 (or STAT 470 in Spring Term)[1]		3	STAT 470 (or STAT 471 in Fall Term)[1]	3
PSYC 400 Level Class		3	PSYC 480 or 489	3
Upper Division Writing Gen Ed		3	STAT 462	3
Free Elective		6	STAT 460, 463, 469, or 472	3
			Free Elective	3
		15		**15**

Total Credits: 120

1

STAT 470 or 471 - only one of these is required. Once one is completed, if additional credit is needed to reach 120, student can take an elective.

2

Students is required to take two courses from STAT 460, 463, 469 472 for 6 in the major.

Behavioral Statistics

Department Information

- **Department Web Site:**
  www.ndsu.edu/statistics/ (http://www.ndsu.edu/statistics/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/behavioral-statistics/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/behavioral-statistics/#planofstudytext)

Major Requirements

Major: Behavioral Statistics

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Behavioral Statistics Requirements		
PSYC 111	Introduction to Psychology	3
PSYC Elective	200-400 Level Psychology Electives	6
PSYC 350	Research Methods I	3
PSYC 351	Research Methods II	3
PSYC Elective	400 Level Psychology Elective	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
STAT 331	Regression Analysis	2
STAT 462	Introduction to Experimental Design (Capstone)	3
STAT 470	Statistical SAS Programming	3
or STAT 471	Introduction to the R Language	
Select two courses from the following:		6
STAT 460	Applied Survey Sampling	
STAT 463	Nonparametric Statistics	
STAT 469	Introduction to Biostatistics	
STAT 472	Time Series	
Select one course from 3 of the following 4 groups (A-D)		
Group A - Social/Personality:		3
PSYC 453	Organizational Psychology	
PSYC 468	Personality	
PSYC 470	Experimental Social Psychology	
Group B - Perception/Cognition:		3
PSYC 460	Sensation & Perception	
PSYC 461	Memory And Knowledge	
PSYC 464	Attention & Thinking	
Group C - Biological Bases of Behavior:		3
PSYC 465	Psychobiology	
PSYC 481	Health Psychology	
PSYC 486	Neuropsychology	
Group D - Individual Differences:		3
PSYC 463	Experimental Developmental Psychology	
PSYC 471	The Psychology Of Aging	
PSYC 472	Advanced Psychopathology	
PSYC 473	Child Psychopathology and Therapy	
Capstone Experience: Select one of the following courses or have completed one course from each of the 4 groups (A-D):		2-3
PSYC 480	History & Systems	
PSYC 489	Honors Thesis	
Related Courses Required		
ANTH 111	Introduction to Anthropology (May satisfy general education category B and D)	3
BIOL 126	Human Biology (May satisfy general education category S)	3
CSCI 114	Computer Applications (May satisfy general education category S)	3
or TL 116	Business Software Applications	
MATH 103	College Algebra (or higher level if needed as a prerequisite)	3
SOC 110	Introduction to Sociology (May satisfy general education category B)	3
Total Credits		**64-65**

Program notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Biochemistry and Molecular Biology

Department Information

- **Department Web Site:**
  www.ndsu.edu/chemistry/ (http://www.ndsu.edu/chemistry/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/biochemistry-molecular-biology/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/biochemistry-molecular-biology/)

Biochemistry is concerned with the chemistry of the materials fundamental to life and contributes toward the understanding of the structure and functioning of all organisms. Because of the rapid advances in the areas of biotechnology, molecular biology and genetic engineering, biochemistry is an exciting area for study and research.

Background Information

The undergraduate program in biochemistry at North Dakota State University is planned for students who are seeking careers in the life sciences, agriculture, medicine or health related fields. The program is also suited for students who are contemplating advanced graduate degrees in biochemistry, botany, zoology and microbiology, or professional degrees in dentistry and medicine.

The biochemistry program is offered by the Department of Chemistry and Biochemistry.

The Program

Students with an interest in biochemistry earn the Bachelor of Science degree in biochemistry and molecular biology. This provides flexibility in the selection of courses for those students who plan to seek employment in areas related to biochemistry, enter graduate or medical school, or teach in high schools or higher education institutions. The program provides training in biochemistry, botany, microbiology, zoology or in applied areas according to the student's interest. In addition to the courses in chemistry, physics and mathematics, an additional 16 credits in biological sciences, 18 credits of electives in the humanities and social sciences, nine credits in English, three credits in speech and two credits in wellness are required. The pre-medical student is encouraged to take a year of upper-level zoology.

All undergraduates in biochemistry and molecular biology receive assistance in planning and scheduling classes from faculty advisors. In addition to course work and laboratory courses, students also have the opportunity to learn by conducting research in various areas of biochemistry under faculty guidance.

Faculty and Facilities

The Department of Chemistry and Biochemistry is well staffed with 17 faculty members. All of the faculty have doctorate degrees from well-known universities. Most of them have considerable experience in postdoctoral or industrial research.

The research and teaching facilities for the department are housed in four buildings— A. Glenn Hill Center, Ladd Hall, Dunbar Laboratories, and the Quentin Burdick Building.

Advanced instruments and facilities are readily available. These include ultracentrifuges; gene synthesizer; nuclear magnetic, infrared, ultraviolet and mass spectrometers; gas and liquid chromatographs; computers; recombinant DNA and cell and tissue culture laboratories; and an advanced electron microscope facility.

Career Opportunities

Employment opportunities for biochemists are found at higher education institutions within the chemistry, biochemistry and biological sciences departments; in medical schools, hospitals, research institutes and government research laboratories; and in other health, energy, environment and agricultural research programs. Biochemists are employed at all levels in industries concerned with food processing, manufacturing, genetic engineering and marketing of drugs, cosmetics and pesticides, as well as in the petroleum and allied industrial complexes.

Earnings of persons trained in biochemistry vary, and the salary level depends largely upon the amount of formal training a person has received. Entry-level salaries for biochemists average $44,100 per year, based on 2016 data from www.payscale.com. For biochemists who have an advanced degree, salaries and opportunities are much greater.

High School Preparation

A strong high school background in English, mathematics (through trigonometry, if possible), biology, chemistry and physics is recommended.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
BIOL 150 & 150L		4	MATH 166	4
CHEM 121 & CHEM 160		4	ENGL 120 (Communication Gen Ed)	3
ENGL 110 (Communication Gen Ed)		3	CHEM 122 & CHEM 161	4
MATH 165 (Quant. Reasoning Gen Ed)		4	BIOL 151	3
		15		**14**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
COMM 110 (Communication Gen Ed)		3	PHYS 252 & 252L (Science & Tech Gen Ed)	5
CHEM 341		3	CHEM 342	3
CHEM 353		1	CHEM 354	2
BIOL 315		3	Humanities/Fine Arts and Global Perspectives Gen Ed	3
PHYS 251 & 251L (Science & Tech Gen Ed)		5	Social & Beh Sci and Cultural Diversity Gen Ed	3
		15		**16**
Junior				
Fall	**Credits**		**Spring**	**Credits**
BIOC 460		3	CHEM 380	1
BIOC 460L		1	BIOC 461	3
CHEM 431		3	BIOC 474	3
MICR 350 & 350L		5	STAT 330	3
ENGL 321 or 324 (Communication Gen Ed)		3	300-400 Level Science Elective[1]	3
			300-400 Level Science Elective[1]	3
		15		**16**
Senior				
Fall	**Credits**		**Spring**	**Credits**
BIOC 473		4	BIOC 487	3
BIOC 483		3	CHEM 491	2
CHEM 465		4	300-400 Level Science Electives[1]	3
Free Elective		3	Wellness Gen Ed	2

	Free Elective	6
	14	**16**

Total Credits: 121

1

Courses in BIOL, BOT, ZOO, CHEM, CSCI, MICR, PSCI, PHYS, PPTH, or STAT. No more than 6 credits from one prefix may apply. Research credits (CHEM 494/BIOC 494) may count towards 3 of these credits.

Biochemistry and Molecular Biology

Department Information

- **Department Web Site:**
  www.ndsu.edu/chemistry/ (http://www.ndsu.edu/chemistry/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/biochemistry-molecular-biology/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/biochemistry-molecular-biology/#planofstudytext)

Major Requirements

Major: Biochemistry & Molecular Biology

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Biochem & Molecular Biology Requirements		
BIOC 460	Foundations of Biochemistry and Molecular Biology I *	3
BIOC 460L		1
BIOC 461	Foundations of Biochemistry and Molecular Biology II *	3
BIOC 473	Methods of Biochemical Research *	4
BIOC 474	Methods of Recombinant DNA Technology *	3
BIOC 483	Cellular Signal Transduction Processes and Metabolic Regulations *	3
BIOC 487	Molecular Biology of Gene Expression	3
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
Select one of the following:		4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
Select one of the following:		4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 341	Organic Chemistry I	3
CHEM 342	Organic Chemistry II	3
CHEM 353	Majors Organic Chemistry Laboratory I	1
CHEM 354	Majors Organic Chemistry Laboratory II	2
CHEM 465	Survey of Physical Chemistry	4
CHEM 380	Chemistry Junior Seminar	1
CHEM 431	Analytical Chemistry I	3
CHEM 491	Seminar	2
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
or ENGL 324	Writing in the Sciences	
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
STAT 330	Introductory Statistics (May satisfy general education category R)	3
BIOL 315	Genetics	3
or PLSC 315	Genetics	
Upper-Level Science Electives		
300-400 level courses in BIOL, BIOC, BOT, ZOO, CHEM, CSCI, MICR, PSCI, PHYS, PPTH, or STAT. No more than 6 credits from one prefix may apply. Research credits (CHEM 494/BIOC 494; CHEM 493/BIOC 493) may count towards 3 of these credits.		9
Total Credits		**92**

*
Students in the accelerated program may substitute the 600 level course equivalent to use in both the undergraduate and graduate degree programs. No more than 15 credits of 600 level coursework can apply to the undergraduate degree program.

Degree Notes:

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.
- This major is eligible as an accelerated program for the student to earn a B.S. in Biochemistry & Molecular Biology and a M.S. in Biochemistry. Students may complete either a thesis or non-thesis option in the master's program.

Minor Requirements

Minor: Biochemistry and Molecular Biology

Required Credits: 16

Minor Requirements

Code	Title	Credits
Required Courses		
All minor courses must be selected in consultation with a Biochemistry adviser.		16
Total Credits		**16**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- The student and adviser will complete a substitution form with the courses to be used for the biochemistry minor. This form will also requires the signature of the department chairperson before being submitted to the Office of Registration and Records for verification of minor program completion.
- Note: This minor will not be available for view in the Student Advisement/Requirement Report in Campus Connection.

Biological Sciences

Department Information

- **Department Web Site:**
  www.ndsu.edu/biology/ (http://www.ndsu.edu/biology/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/biological-sciences/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/biological-sciences/)

Biological sciences is an exciting, rewarding area of science that prepares students for a variety of careers. Biology is at the intersection of many societal challenges including environmental quality and human health, and our students finish their degrees well prepared to help solve these problems. The program provides hands-on experience in biological research and focuses on student experience and interests. Department faculty are involved in scientific research that answers questions in molecular and cellular biology, evolution, population biology, ecology, and science education. Students interested in biological sciences will need a strong interest and aptitude in the sciences and possess the ability to think both analytically and comprehensively.

CAREER Opportunities

Students graduate with an excellent foundation to pursue rewarding careers or gain admission into graduate and professional programs. Our graduates pursue many different careers including medical doctors, optometrists, dentists, physician assistants, chiropractors, genetic counselors, veterinarians, state and federal wildlife biologists, naturalists, wildlife rehabilitators, directors of zoological parks, conservation biologists, environmental consultants, teachers, and researchers. Students leave well-prepared to continue in graduate degree programs that require a solid background in the biological sciences. Most professional scientists can anticipate graduate education as being essential for career advancement.

High School Preparation

High school students are encouraged to take year-long courses in biology, chemistry, physics, algebra, geometry and trigonometry and, if available, an advanced science course and pre-calculus.

The Program

The program integrates studies in zoology, botany, and biological sciences and offers students the flexibility to customize their field of study to align course selection with educational and professional goals. The program integrates broad-based biology foundation classes with specializations, such as biomedical science or conservation biology, in later years. With appropriate course selection, the biological sciences degree provides a broad understanding of the complex relationship between the living and nonliving world. Students choose a research-based course in biology that focuses on antibiotics, wild-life ecology and conservation, STEM education, genomics, or biomedical research. Students have the option to choose an emphasis in Biomedical Science, Ecology and Conservation, or Environmental Sciences. Students planning to enter a health professional program, such as medical school, should refer to the plan of study for the Biomedical Science emphasis. Minors are available in Zoology and Botany with a Biological Sciences minor option for non-biology majors.

PROGRAM OUTCOMES

1. Makes connections between biology, the physical sciences and math.
2. Identifies scientific issues and uses the scientific method, including experimental design, data collection, analysis, and interpretation.
3. Understands the philosophical underpinnings of scientific reasoning.
4. Demonstrates the ability to use sources of information in biology, including published literature and scientific databases, and to evaluate the quality of information sources.
5. Demonstrates the ability to acquire and analyze experimental data and use quantitative analysis to interpret biological data.
6. Demonstrates the ability to develop numerical and graphical models and to simulate biological mechanisms.
7. Demonstrates the ability to use scientific techniques necessary for date gathering and analysis.
8. Communicates effectively in writing, speech, and visual presentations within a variety of contexts.
9. Understands the role of teamwork and individual effort in scientific endeavors; discusses issues constructively and appreciates different ideas and viewpoints.
10. Understands professional standards in science and its applications, including the responsible use of information.

Related Experiences

Career and professional program opportunities are enhanced by work experiences and extra-curricular involvement including student organization participation, internships, volunteering, work and research experiences. Part-time, science-related work and research experiences are available in several North Dakota State University departments, as well as at the nearby U.S. Department of Agriculture laboratories. Off-campus work, such as summer employment with public agencies or private organizations, is especially valuable and has sometimes been the entry point for a first permanent position after graduation. NDSU offers many extra-curricular activities, including student organizations suitable to diverse personal and professional interests.

Accelerated Program

The Department of Biological Sciences offers an Accelerated Bachelor and Master of Science program. The program allows students to begin thesis research during their junior year and simultaneously pursue their Bachelor of Science and Master of Science degrees in biological sciences. Students will work closely with a faculty member in our department who will serve as a mentor. The program is designed to produce a research-based master's degree. Students must be at junior standing with a minimum cumulative GPA of 3.5.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 189	1	BIOL 151 & 151L	4
BIOL 150 & 150L	4	CHEM 122 & 122L	4
CHEM 121 & 121L	4	ENGL 120	3
ENGL 110	3	MATH 146 or 165	4
MATH 103	3		
	15		**15**

Second Year				
Fall	**Credits**		**Spring**	**Credits**
BIOL 315 & 315L		4	PHYS 120 (or PHYS 211, and 211L, and 212, and 212L)	3
BIOL 270, 271, 272, 273, 274, or 275		3	BIOL 364 or 370	3
CHEM 240 (or CHEM 341, and 341L, and 342, and 342L))		3	Social & Behavioral Sciences Gen Ed	3
COMM 110		3	Wellness Gen Ed	2
STAT 330		3	BIOL 359	3
			Free elective	3
		16		**17**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
ENGL 324		3	BIOL 300-400 Elective	3
BIOL 300-400 Elective		3	Social & Behavioral Science/Global Perspective Gen Ed	3
Humanities & Fine Arts/Cultural Diversity Gen Ed		3	Free Elective	9
Free Elective		6		
		15		**15**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
BIOL 300-400 Elective		6	BIOL 300-400 Elective	3
Humanities & Fine Arts Gen Ed		3	Free Elective	9
Free Elective		6		
		15		**12**

Total Credits: 120

Biological Sciences

Department Information

- **Department Web Site:**
  www.ndsu.edu/biology/ (http://www.ndsu.edu/biology/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/biological-science/ (http://catalog.ndsu.edu/programs-study/undergraduate/biological-science/)

Major Requirements

Major: Biological Sciences

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.

5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Biological Sciences Core Requirements		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category s)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
MATH 146	Applied Calculus I (May satisfy general education category R) [2]	4
or MATH 165	Calculus I	
STAT 330	Introductory Statistics	3
BIOL 189	[1]	1
BIOL 270	Undergraduate Research Experience: Antibiotic Discovery	3
or BIOL 271	Undergraduate Research Experience: Diet and Exercise Physiology	
or BIOL 272	Undergraduate Research Experience: Health and Wellness Decisions	
or BIOL 273	Undergraduate Research Experience: Genomic Analysis	
or BIOL 274	Undergraduate Research Experience: Biomedical Research Analysis	
or BIOL 275	Undergraduate Research Experience: Insect Behavior	
BIOL 315 & 315L	Genetics and Genetics Laboratory	4

BIOL 359	Evolution	3
Emphasis Area		
Select one of the emphasis areas listed below to complete the major requirements		29-59
Total Credits		**63-93**

1

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

2

Students interested in graduate programs that require 2 semesters of calculus should take MATH 165 and 166.

Standard emphasis

Code	Title	Credits
BIOL 364	General Ecology	3
or BIOL 370	Cell Biology	
Select one from the following:		3 or 8
CHEM 240	Survey of Organic Chemistry (or)	
CHEM 341 & 341L & CHEM 342 & CHEM 342L	Organic Chemistry I and Organic Chemistry I Laboratory and Organic Chemistry II and Organic Chemistry II Laboratory	
Select one from the following:		3 or 8
PHYS 120	Fundamentals of Physics (or)	
PHYS 211 & 211L & PHYS 212 & PHYS 212L	College Physics I and College Physics I Laboratory and College Physics II and College Physics II Laboratory	
Select 15 credits of any 300-400 level course offered in the department		15
BIOL 364	General Ecology (if not used to meet the above requirement)	
BIOL 370	Cell Biology (if not used to meet the above requirement)	
BIOL 379	Global Seminar	
BIOL 410	Comparative Chordate Morphology	
BIOL 414	Plant Systematics	
BIOL 444	Vertebrate Histology	
BIOL 450	Invertebrate Zoology	
BIOL 452	Ichthyology	
BIOL 454	Herpetology	
BIOL 456	Ornithology	
BIOL 458	Mammalogy	
BIOL 460	Animal Physiology	
BIOL 461	Plant Ecology	
BIOL 462	Physiological Ecology	
BIOL 463	Animal Behavior	
BIOL 464	Endocrinology	
BIOL 465	Hormones and Behavior	
BIOL 470		
BIOL 472	Structure and Diversity of Plants and Fungi	
BIOL 475	Conservation Biology	
BIOL 476	Wildlife Ecology and Management	
BIOL 477	Wildlife and Fisheries Management Techniques	
BIOL 479		
BIOL 480	Ecotoxicology	
BIOL 481	Wetland Science	

BIOL 482	Developmental Biology
BIOL 483	Cellular Mechanisms of Diseases
Total Credits	**24-34**

Biomedical sciences emphasis

Code	Title	Credits
BIOL 370	Cell Biology	3
CHEM 341	Organic Chemistry I	3
CHEM 341L	Organic Chemistry I Laboratory	1
CHEM 342	Organic Chemistry II	3
CHEM 342L	Organic Chemistry II Laboratory	1
PHYS 211	College Physics I	3
PHYS 211L	College Physics I Laboratory	1
PHYS 212	College Physics II	3
PHYS 212L	College Physics II Laboratory	1
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
Select 12 credits from the following - at least 9 credits must have BIOL prefix		12
BIOC 461	Foundations of Biochemistry and Molecular Biology II	
BIOL 410	Comparative Chordate Morphology	
BIOL 444	Vertebrate Histology	
BIOL 460	Animal Physiology	
BIOL 464	Endocrinology	
BIOL 465	Hormones and Behavior	
BIOL 479		
BIOL 482	Developmental Biology	
BIOL 483	Cellular Mechanisms of Diseases	
MICR 350	General Microbiology	
MICR 460	Microbial Pathogenesis	
MICR 470	Basic Immunology	
BIOL Course	Choose one additional 3 credit 300-400 level BIOL course offered by the department	3
Total Credits		**37**

ecology and conservation Science emphasis

Code	Title	Credits
BIOL 364	General Ecology	3
BIOL 475	Conservation Biology	3
or BIOL 476	Wildlife Ecology and Management	
Select one from the following:		3 or 8
CHEM 240	Survey of Organic Chemistry	
CHEM 341 & 341L & CHEM 342 & CHEM 342L	Organic Chemistry I and Organic Chemistry I Laboratory and Organic Chemistry II and Organic Chemistry II Laboratory	
Select one from the following:		3 or 8
PHYS 120	Fundamentals of Physics	
PHYS 211 & 211L & PHYS 212 & PHYS 212L	College Physics I and College Physics I Laboratory and College Physics II and College Physics II Laboratory	
Select 9 credits from the following - at least 6 credits must have a BIOL prefix		9
BIOL 414	Plant Systematics	
BIOL 450	Invertebrate Zoology	
BIOL 452	Ichthyology	

BIOL 454	Herpetology	
BIOL 456	Ornithology	
BIOL 458	Mammalogy	
BIOL 460	Animal Physiology	
BIOL 461	Plant Ecology	
BIOL 462	Physiological Ecology	
BIOL 463	Animal Behavior	
BIOL 470		
BIOL 472	Structure and Diversity of Plants and Fungi	
BIOL 475	Conservation Biology (if not used to meet the above requirement)	
BIOL 476	Wildlife Ecology and Management (if not used to meet the above requirement)	
BIOL 477	Wildlife and Fisheries Management Techniques	
BIOL 480	Ecotoxicology	
BIOL 481	Wetland Science	
RNG 450	Range Plants	
ENT 350	General Entomology	
ENT 470	Insect Ecology	
MICR 350	General Microbiology	
MICR 452	Microbial Ecology	
MICR 460	Microbial Pathogenesis	
PPTH 460	Fungal Biology	
PLSC 433	Weed Biology and Ecology	
SOIL 351	Soil Ecology	
BIOL Course	Choose one additional 3 credit 300-400 level BIOL course offered by the department	3
Total Credits		**24-34**

environmental science emphasis

Code	Title	Credits
BIOL 364	General Ecology	3
BIOL 480	Ecotoxicology	3
GEOL 105	Physical Geology	3
GEOL 105L	Physical Geology Lab	1
GEOL 106L	The Earth Through Time Lab	1
GEOL 106	The Earth Through Time	3
PHYS 211L	College Physics I Laboratory	1
PHYS 211	College Physics I	3
PHYS 212L	College Physics II Laboratory	1
PHYS 212	College Physics II	3
SOIL 210	Introduction to Soil Science	3
SOIL 410	Soils and Land Use	3
Select one from the following:		3
PLSC 380	Principles of Plant Physiology	
BIOL 414	Plant Systematics	
BIOL 461	Plant Ecology	
BIOL 472	Structure and Diversity of Plants and Fungi	
RNG 450	Range Plants	
Select one of the following sequences:		3 or 8
CHEM 240 & BIOC 260	Survey of Organic Chemistry and Elements of Biochemistry (or)	
CHEM 341 & 341L & CHEM 342 & BIOC 460	Organic Chemistry I and Organic Chemistry I Laboratory and Organic Chemistry II and Foundations of Biochemistry and Molecular Biology I	

Choose one of the following:		3 or 8
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory (or)	
GEOL 428	Geochemistry	
BIOL Courses	Choose an additional 12 credits of 300 - 400 level BIOL courses offered by the department	12
Total Credits		**49-59**

Degree and Program Note:

- Botany and/or Zoology minors: Students completing a botany or zoology minor along with their biological sciences major must take a 300 or 400 level elective in the minor that is different from any 300 or 400 level electives taken for the major emphasis area. The only classes that students can take in common for the biological sciences major and the botany and/or zoology minor are the BIOL 150/150L, BIOL 151/151L, and BIOL 359 courses.
- Except for courses offered only with pass/fail grading, no course may be requested to take as Pass/Fail grading for this major.

Minor Requirements

Minor: Biological Sciences

Required Credits: 17

Minor Requirements

Code	Title	Credits
Required Courses		
BIOL 150	General Biology I	3
BIOL 150L	General Biology I Laboratory	1
BIOL 151	General Biology II	3
BIOL 151L	General Biology II Laboratory	1
BIOL 359	Evolution	3
Select one of the following:		**3**
BIOL 364	General Ecology	
BIOL 370	Cell Biology	
Electives: Select one of the 300-400 level courses listed below		**3**
BIOL 364	General Ecology (if not used above)	
BIOL 370	Cell Biology (if not used above)	
BIOL 410	Comparative Chordate Morphology	
BIOL 414	Plant Systematics	
BIOL 444	Vertebrate Histology	
BIOL 450	Invertebrate Zoology	
BIOL 452	Ichthyology	
BIOL 454	Herpetology	
BIOL 456	Ornithology	
BIOL 458	Mammalogy	
BIOL 460	Animal Physiology	
BIOL 461	Plant Ecology	
BIOL 462	Physiological Ecology	
BIOL 463	Animal Behavior	
BIOL 464	Endocrinology	
BIOL 465	Hormones and Behavior	
BIOL 470		
BIOL 472	Structure and Diversity of Plants and Fungi	
BIOL 475	Conservation Biology	
BIOL 476	Wildlife Ecology and Management	
BIOL 477	Wildlife and Fisheries Management Techniques	
BIOL 479		
BIOL 480	Ecotoxicology	

BIOL 481	Wetland Science
BIOL 482	Developmental Biology
BIOL 483	Cellular Mechanisms of Diseases
Total Credits	**17**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Classes taken for the biological sciences minor cannot be double-counted with courses taken to fulfill botany and/or zoology minors. The credits must be unique from courses used to fulfill the biological sciences minor. The only classes that can be double counted are BIOL 150/L, 151/L, and 359.

Biological Sciences Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/biological-sciences-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/biological-sciences-education/)

Biological sciences, in the broadest sense, is the study of life in the natural world. As such, it is a subject of great diversity and requires a background in many academic disciplines. Teaching biological sciences in middle or secondary schools requires deep knowledge of (a) science content, (b) current theories of adolescent development, and (c) current best practices in middle and secondary instruction. Accordingly, the biological sciences education major combines coursework in biology and related sciences with professional education courses on teaching and learning.

The Program

Candidates in biological sciences education are prepared to teach students in grades 5-12 with skill and confidence. The program is designed to develop science content knowledge as well as proficiency in a range of science-related skills and laboratory practices. Our professional education courses prepare teacher candidates to incorporate active learning strategies, create effective methods for assessment, and adjust instruction to accommodate diverse learners. Teacher candidates also apply their knowledge and build their teaching skills during multiple clinical experiences in local schools.

Professional Education Courses

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

STUDENT TEACHING

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

STUDENT ADVISEMENT

Biological sciences teacher candidates are assigned to academic advisors who work closely with them to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to meet with their advisor at least once every semester, as well as whenever needed.

Licensure

Upon completing this program, teacher candidates are eligible for teacher licensure in biological sciences in most states. Students who take the Praxis Subject Assessment exam for Biology will be licensed to teach biology and related secondary courses, as well as middle school sciences. Teacher candidates who choose to take the Praxis Subject Assessment exam for General Science will be licensed to teach all areas of middle school and high school science. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPB).

Career Opportunities

Science teachers are in high demand across the country, so our graduates usually obtain full-time employment in school districts shortly after graduation.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 150 & 150L	4	BIOL 151 & 151L	4
ENGL 110	3	COMM 110	3
GEOL 105 & 105L	4	ENGL 120	3
MATH 105 or 146	3-4	GEOL 106 & 106L	4
		Social & Behavioral Science Gen Ed*	3
	14-15		**17**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 220 & 220L	4	BIOL 221 & 221L	4
CHEM 121 & 121L	4	CHEM 122 & 122L	4
EDUC 321	3	EDUC 322	3
MICR 202 & 202L	3	Humanities & Fine Arts Gen Ed*	
Humanities & Fine Arts Gen Ed*	3	Social & Behavioral Sciences Gen Ed*	3
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
	17		**14**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 315 & 315L	4	BIOL 359	3
BIOL 364	3	EDUC 481	3
EDUC 451	3	EDUC 486	3
PHYS 120 & 120L	4	SOIL 217	3
Wellness Gen Ed	2	STAT 330	3
	16		**15**
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 370	3	EDUC 485	1
EDUC 475	2	EDUC 487	9

EDUC 482	3	EDUC 488	3
EDUC 489	3		
ENGL 324	3		
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
	14		**13**

Total Credits: 120-121

*
One of these General Education courses needs to be selected from Category D - Cultural Diversity.

Biological Sciences Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/biological-sciences-education/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/biological-sciences-education/#planofstudytext)

Major Requirements

Major: Biological Sciences Education

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**
Category A: Humanities and Fine Arts †		**6**

Category B: Social and Behavioral Sciences †	**6**
Category W: Wellness †	**2**
Category D: Cultural Diversity *†	
Category G: Global Perspectives *†	
Total Credits	**39**

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Teaching Specialty Requirements		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
BIOL 359	Evolution	3
BIOL 364	General Ecology	3
BIOL 370	Cell Biology	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
ENGL 324	Writing in the Sciences (May satisfy general education category C)	3
GEOL 105 & 105L	Physical Geology and Physical Geology Lab (May satisfy general education category G)	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
Pick one of the following math classes:		3-4
MATH 105	Trigonometry	
MATH 146	Applied Calculus I	
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
Pick one of the following:		4
PHYS 120 & 120L	Fundamentals of Physics and Fundamentals of Physics Laboratory	
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	
SOIL 217	Introduction to Meteorology & Climatology	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Science)	3
EDUC 482	Classroom Practice/Methods of Teaching II: (Science)	3

EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		**98-99**

Degree Requirements and Notes

- See School of Education (https://www.ndsu.edu/education/) for admission requirements.
- Courses taken P/F may not be used to satisfy any requirements.
- A grade of 'C' or better is required in all professional education courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.
- Biological Sciences Majors: Electives taken for the Biological Sciences major cannot be double-counted with the Zoology minor. The only classes that can be double counted are BIOL 150/150L, 151/151L, and 359.

Biomedical Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/coe/future_students/biomedical_engineering/ (http://www.ndsu.edu/coe/future_students/biomedical_engineering/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/biomedical-engineering/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/biomedical-engineering/)

Biomedical engineering is highly relevant to the 21st century research and education needs of the citizens of North Dakota and providing opportunity to students in one of the highest demand fields today. The current high quality education received by engineering students at NDSU will be augmented with the biomedical engineering minor allowing graduates to more readily be able to contribute to the global demand for medical technologies and innovations. Employers are supportive and encouraging the addition of biomedical minor at NDSU.

Biomedical Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/coe/future_students/biomedical_engineering/ (http://www.ndsu.edu/coe/future_students/biomedical_engineering/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/biomedical-engineering/ (http://catalog.ndsu.edu/programs-study/undergraduate/biomedical-engineering/)

Minor Requirements

Minor: Biomedical Engineering

Required Credits: 21

Code	Title	Credits
Core Requirements		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151	General Biology II	3
BME 220	Introduction to Biomedical Engineering	2
BIOL 370	Cell Biology	3

or BIOL 460	Animal Physiology	
Elective Requirements (at least 6 of the 9 credits must be courses with an engineering prefix of CE, ECE, IME, ME)		9
BIOC 461	Foundations of Biochemistry and Molecular Biology II	
BIOL 220	Human Anatomy and Physiology I	
BIOL 220L	Human Anatomy and Physiology I Laboratory	
BIOL 221	Human Anatomy and Physiology II	
BIOL 221L	Human Anatomy and Physiology II Laboratory	
BIOL 370	Cell Biology (if not used in the core)	
BIOL 460	Animal Physiology (if not used in the core)	
CE 486	Nanotechnology and Nanomaterials	
ECE 483	Instrumentation for Engineers	
ECE 485	Biomedical Engineering	
ECE 486	Biosensing Technology	
ECE 487	Cardiovascular Engineering	
ECE 488	Cardiovascular Engineering II	
IME 411	Human Factors Engineering	
IME 453	Hospital Management Engineering	
ME 331	Materials Science and Engineering	
ME 468	Introduction to Biomechanics	
ME 480	Biofluid Mechanics	
ME 486	Nanotechnology and Nanomaterials	
MICR 445	Animal Cell Culture Techniques	
Undergraduate Research or Individual Study (maximum 3 credits): ENGR/ME/ECE/CE/IME/ABEN 193, 293, 393, 493, 194, 294, 394 or 494		
Total Credits		**21**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Course pre-requisites apply.
- At least 12 credits that apply to this minor must be unique from courses that apply to the student's major.

Biotechnology

Department Information

- **Department Web Site:**
  www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences (http://www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences/)
- **Credential Offered:**
  B.S.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/biotechnology/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/biotechnology/)

Biotechnology is an interdisciplinary field that combines biology and technology to design and produce new molecules, plants, animals, and microorganisms with improved characteristics. Biotechnology offers seemingly unlimited opportunities to combine genes from related or unrelated species to produce useful organisms with desirable properties not previously found in nature.

Biotechnology may be considered a collection of technologies using animal and/or plant cells, biological molecules, molecular biology processes, and genetic engineering for applications in medicine, agriculture, and the pharmaceutical industry. The technologies include the use of recombinant DNA for gene cloning and gene transfers between organisms; culture of plant and animal cells and tissues; fusion of animal cells or plant protoplast; the regeneration of whole plants from single cells and the large-scale fermentation processes that use some of these novel organisms for the production of pharmaceuticals, diagnostic tests for diseases, feed additives, enzymes, and hormones.

Examples of successful biotechnology include the development of crop plants resistant to herbicides or insects, the production of human growth hormone and insulin by genetically engineered bacteria, and the development of unique vaccines.

CAREER OPPORTUNITIES

Biotechnology continues to develop rapidly into new research areas. Surveys indicate there will be a continuing high demand for well-educated personnel. Job opportunities are found in college and university life science departments, private and government research institutes, food production, pharmaceutical and agrochemical industries, and biotechnology industries. Graduates of this program have the educational background and laboratory experience to take advantage of any of these job opportunities. Graduates of the biotechnology program are now successful and productive scientists at pharmaceutical, agrochemical, and biotechnology companies, as well as government and private research institutions here in Fargo and throughout the country.

Scholarship Opportunities

- Biotechnology Scholarship, ~$200

HIGH SCHOOL PREPARATION

Students entering the biotechnology program should have a strong background in mathematics, including trigonometry, biology, chemistry, physics, writing and computer courses. A composite ACT score of 26 or higher is recommended.

TRANSFER STUDENT PREPARATION

Transfer students are strongly advised to take transferable general education and intro biology and chemistry courses in preparation for upper-level science courses at NDSU.

The Curriculum

The recommended course of study includes courses to develop special skills needed to enter the rapidly expanding and changing biotechnology field. In addition to the required courses, students may select from various specialized elective science courses to help develop a particular area of interest. Students majoring in biotechnology are required to either complete an internship or perform a research project in the laboratory of a faculty advisor. The biotechnology program leads to a Bachelor of Science degree.

Program Outcomes

1. Demonstrate a familiarity with professional and ethical behavior in biotechnology.
2. Identify and explain biotechnology discipline-specific knowledge and concepts.
3. Describe the process of scholarly inquiry in biotechnology
4. Perform classical and modern biotech techniques with consistency.
5. Communicate scientific results and scientific understanding to a chosen audience.
6. Participates effectively as a team member in collaborative work.
7. Exhibit professional skills and personal effectiveness to enter the job market.
8. Describe their role and begin participating in being civically responsible, contributing citizens, and creating inclusive environments.

Student organizations

We have an active Biotechnology and Microbiology Club that tours local businesses related to biotechnology and microbiology, hosts guest speakers currently working in the fields of microbiology and biotechnology, and meets for social events throughout the year.

The Faculty and Facilities

The faculty who advise, teach, and serve as research mentors for the biotechnology program are spread among several academic departments. The departments include plant sciences, biological sciences, biology, chemistry, biochemistry, and molecular biology; animal and range sciences; plant pathology; veterinary and microbiological sciences; and pharmaceutical sciences. Several North Dakota State University Center for Nanoscale Science and Engineering scientists and the on-campus USDA facilities also serve as research mentors.

Laboratory facilities and specialized equipment are used for instruction and research. These include animal and plant tissue culture facilities, small animal housing, electron and confocal microscopes, automated DNA sequencing equipment, equipment for performing microarray experiments, and NDSU Core Labs. The Core Labs are shared cutting-edge research facilities and include the Advanced Imaging and Microscopy Core, Core Biology Facility, Core Synthesis and Analytical Services, Biotech Innovation Core, and the Electron Microscopy Core Laboratory, among many other state-of-the-art facilities and equipment.

Most (approximately 60 percent) of biotechnology program graduates choose to continue their education in graduate or professional schools. Biotechnology program graduates have earned master's and doctoral degrees in many diverse areas, including cellular and molecular biology, biology,

microbiology, plant sciences, animal physiology, cancer biology, and virology, at many of the most respected universities in the United States. We also offer an accelerated bachelor of science pathway into a Master of Microbiology, completed both in 4-5 years.

POSTGRADUATE OPPORTUNITIES

Graduate School. The biotechnology major emphasizes experiential learning in coursework and research laboratories that provide the foundation to be successful in graduate school. We even offer an accelerated master's in microbiology program to help students optimize their timeline to complete their graduate degree while finishing their bachelor's degree.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
MICR 189*		1	Humanities/Fine Arts Gen Ed	3
ENGL 110		3	ENGL 120	3
MATH 165		4	BIOL 151	3
BIOL 150		3	BIOL 151L	1
BIOL 150L		1	CHEM 122	3
CHEM 121		3	CHEM 122L	1
CHEM 121L		1	Wellness Gen Ed	2
		16		**16**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
COMM 110		3	Humanities/Fine Arts & Cultural Diversity Gen Ed	3
STAT 330		3	CHEM 342	3
MICR 350		3	PLSC 315	3
MICR 350L		2	PLSC 315L	1
CHEM 341		3	MICR 455 or BME 220 (select one)	3
CHEM 341L		1		
		15		**13**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
PHIL Ethics Requirement [1]		3	Upper Division Writing Gen Ed	3
PHYS 211		3	PHYS 212	3
PHYS 211L		1	PHYS 212L	1
BIOC 460		3	BIOC 461	3
MICR 470		3	MICR 480, PLSC 380, or BIOL 460 (select one)	3
MICR 471		2	MICR 485	1
		15		**14**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
MICR 482, ANSC 357, or PLSC 431 (select one)		3	CSCI 114 or 122	3
Major Elective		3	BIOC 474	3

Major Elective	3	Major Elective	3
Biotechnology Capstone Elective[2]	2	MICR 486	1
Social & Behavioral Sciences & Global Perspectives	3	Free Elective	5
Free Elective	2		
	16		**15**

Total Credits: 120

*
Only required for first-time, first-year students.

1
Select from PHIL 111, PHIL 210, PHIL 215, PHIL 216, PHIL 225 or PHIL 327

2
493 Research or 497 Internship (must be a minimum of 2 credits)

Biotechnology

Department Information

- **Department Web Site:**
  www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences (http://www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences/)
- **Credential Offered:**
  B.S.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/biotechnology/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/biotechnology/#planofstudytext)

Major Requirements

Major: Biotechnology

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		

Category R: Quantitative Reasoning †	**3**
Category S: Science and Technology †	**10**
Category A: Humanities and Fine Arts †	**6**
Category B: Social and Behavioral Sciences †	**6**
Category W: Wellness †	**2**
Category D: Cultural Diversity *†	
Category G: Global Perspectives *†	
Total Credits	**39**

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major requirements

Code	Title	Credits
Biotechnology Requirements		
MICR 189	Skills for Academic Success [1]	1
CSCI 114	Computer Applications	3
or CSCI 122	Visual BASIC	
MATH 165	Calculus I	4
PHYS 211 & 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
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
PLSC 315 & 315L	Genetics and Genetics Laboratory Cross-listed as BIOL 315/L	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 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342	Organic Chemistry II	3
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOC 474	Methods of Recombinant DNA Technology [2]	4
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 470	Basic Immunology [2]	3
MICR 471	Immunology and Serology Laboratory [2]	2
MICR 485	Capstone Experience I: Reflecting and Planning	1
MICR 486	Capstone Experience II: Reflection and Dissemination	1
Ethics - Select one philosophy/ethics course from the following:		3
PHIL 111	Professional Responsibility and Ethics	
PHIL 210	Ethics	
PHIL 215	Contemporary Moral Issues	
PHIL 216	Business Ethics	

PHIL 225	Environmental Ethics	
PHIL 327	Ethics, Engineering, and Technology	
Capstone - Select one of the following capstone experiences from the following:		2
MICR 493	Undergraduate Research (Research Experience) [3]	
MICR 494	Individual Study	
MICR 497	FE/Coop Ed/Internship (Internship Experience)	
Biotechnology Elective - Select one course from the following:		2-3
BME 220	Introduction to Biomedical Engineering	
MICR 455	Microbial Biotechnology [2]	
Genetics Elective - Select one course from the following:		3
ANSC 357	Animal Genetics [2]	
MICR 482	Microbial Genetics [2]	
PLSC 431	Intermediate Genetics [2]	
Physiology Elective - Select one course from the following:		3
MICR 480	Microbial Physiology [2]	
PLSC 380	Principles of Plant Physiology [2]	
BIOL 460	Animal Physiology [2]	
Major Electives - Select 9 credits from the following:		9
ABEN 263	Biological Materials Processing	
ABEN 456	Biobased Energy [2]	
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts [2]	
ASM 234	3D Printing and Manufacturing	
BIOC 473	Methods of Biochemical Research [2]	
BIOC 487	Molecular Biology of Gene Expression [2]	
CFS 462	Food Ingredient Technology [2]	
CHEM 431	Analytical Chemistry I [2]	
CPM 436	Biopolymers and Biocomposites [2]	
ENVE 240	Microbiological Principles for Environmental Engineers	
IME 456	Program and Project Management	
MICR 352	Critical Skills in Microbiology	
MICR 352L	Critical Skills in Microbiology Laboratory Research	
MICR 445	Animal Cell Culture Techniques [2]	
MICR 481	Microbial Genomics with Computational Laboratory [2]	
PLSC 411	Genomics [2]	
PLSC 484	Plant Tissue Culture and Biotechnology [2]	
Total Credits		**90-91**

1

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

2

Courses that offer a 600 level dual course can be taken for the B.S./M.S. accelerated program. The 600 level courses have additional outcomes/ requirements that students will have to complete. Students approved for accelerated programs must complete and submit the *Accelerated Declaration form*, which will require the student and advisor to identify which graduate courses (no more than 15 credits) will be counted toward the B.S. degree.

3

The research may also be completed as BIOC or PLSC.

Degree Notes:

- An accelerated undergraduate to master's degree program is available for the B.S. in Biotechnology major to the M.S. in Microbiology. Students must have a 3.00 GPA. Instructions to apply can be found in the online catalog and a sample 5-year plan can be found on the departments website. Students may complete a thesis-based or comprehensive study-based master's program.

Minor Requirements

Minor: Biotechnology

Required Credits: 20

Code	Title	Credits
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
PLSC 315 & 315L	Genetics and Genetics Laboratory	4
Biotechnology Technique Electives: Select 4 credits from the following:		4
BIOC 473	Methods of Biochemical Research	
BIOC 474	Methods of Recombinant DNA Technology	
MICR 445	Animal Cell Culture Techniques	
MICR 471	Immunology and Serology Laboratory	
PLSC 484	Plant Tissue Culture and Biotechnology	
Specialized Electives: Select 6 credits from the following:		6
ANSC 314		
ANSC 357	Animal Genetics	
MICR 455	Microbial Biotechnology	
MICR 470	Basic Immunology	
MICR 480	Microbial Physiology	
MICR 482	Microbial Genetics	
PLSC 380	Principles of Plant Physiology	
PLSC 431	Intermediate Genetics	
BIOL 370	Cell Biology	
BIOL 460	Animal Physiology	
Total Credits		**20**

Minor Requirements and Notes

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

Botany

Department Information

- **Department Web Site:**
  www.ndsu.edu/biology/ (http://www.ndsu.edu/biology/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/biological-science/ (http://catalog.ndsu.edu/programs-study/undergraduate/biological-science/)

Minor Requirements

Minor: Botany

Required Credits: 17

Code	Title	Credits
Required Courses		
BIOL 150	General Biology I	3
BIOL 150L	General Biology I Laboratory	1
BIOL 151	General Biology II	3
BIOL 151L	General Biology II Laboratory	1
BIOL 359	Evolution	3

BIOL 472	Structure and Diversity of Plants and Fungi	3
300-400 Elective: Select from the following:		3
BIOL 414	Plant Systematics	
BIOL 461	Plant Ecology	
BIOL 475	Conservation Biology	
PLSC 380	Principles of Plant Physiology	
Total Credits		**17**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- *Biological Sciences Majors: Electives taken for the Biological Sciences major cannot be double-counted with the Botany minor. The only classes that can be double counted are BIOL 150/150L, 151/151L, and 359.*

Business Administration

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  B.S.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/business-administration/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/business-administration/)

The global economy offers a vast array of career opportunities for professionals with a collegiate education in business. Businesses need individuals who not only understand the fundamentals of business practice, but who are adaptable in rapidly changing business environments. The business administration program has evolved to meet the needs of organizations and students by providing our students with a broad knowledge base in management, marketing, entrepreneurship, business law, accounting, finance, international business, and management information systems – with a blend of theory and practice. A broad understanding of business is particularly of value for individuals who operate in entrepreneurial firms, smaller enterprises, and organizations that need flexibility and multi-functional knowledge from their employees. Individuals who aspire to own their businesses or go on to graduate studies (e.g., law school) would also benefit from such a broad business knowledge base. Our graduates of the business administration program gain employment in business and non-profit organizations, pursue their own businesses and graduate studies, and enhance their abilities to manage business operations, analyze business opportunities/challenges, work as a team, and make sound decisions.

Background Information

The Association to Advance Collegiate Schools of Business (AACSB International) accredits the undergraduate and graduate programs in the College of Business at North Dakota State University. Our College of Business is one of only two AACSB-accredited schools of business in North Dakota.

AACSB International is one of higher education's most prestigious and rigorous accrediting bodies, emphasizing a commitment to continuous improvement, innovation, engagement, and impact in business education. Less than 10 percent of business programs worldwide have this accreditation, highlighting the academic excellence of our College of Business at NDSU.

The Program

The Business Administration major is a four-year program that is offered in a traditional face-to-face format or fully online. The major comprises a curricular blend of general education, pre-major course work, fundamental business knowledge (accounting, finance, management, marketing, and information systems), business law, entrepreneurship, international business, and business elective courses. The curriculum of this major is also designed with a 21-credit business elective block plus 3 credits of 300/400 level free electives built into the program. These electives allow students to pursue their personal or professional interest in certain business domains, which can be in the form of a specific track, certificate/minor (e.g., Professional Selling, Entrepreneurship, Organizational Leadership), and/or topic-based courses fitting the business knowledge/skills they want to develop. The program nurtures important business skills and administrative competencies including managing/overseeing business enterprises, ability to analyze business opportunities/challenges, legal and international awareness, interpersonal skills, and teamwork. Business Administration students are thus prepared to perform and manage various administrative and functional activities in business enterprises and non-profit organizations.

Selective Admission

Students who wish to study business administration at NDSU enroll as pre-business students in the College of Business for their first semester of their first year. Admission to the major requires the successful completion of the pre-major course requirements (i.e., ENGL 120, COMM 110, MATH 144,

ECON 201 or 202, and PSYC 111 or SOC 110) and a minimum cumulative grade point average (GPA) of 2.50. Transfer students may also be eligible for immediate admission in the major. Contact a College of Business professional advisor for more information.

The Faculty

To provide a rigorous and relevant educational experience to our students, faculty in our program are highly qualified in their respective areas of expertise. Our faculty have been recognized for their teaching excellence by their students and colleagues and for their outstanding research by their peers. They employ a wide variety of instructional techniques and embed both classical and cutting-edge knowledge into their classes. They remain current in their fields by actively engaging in research and/or with firms and business professionals regarding their business practice, challenges, and issues.

The Practicum

Business administration majors are encouraged to complete practicum experiences, ideally at the end of sophomore and junior years. The practicum is designed to enable our students to connect business concepts learned in the classroom with live business situations and to broaden their horizons beyond the classroom setting. The practicum also gives students a competitive edge in job placement.

Career Opportunities

Graduates with a business administration major have career opportunities in business, industry, government service and the non-profit sector, both regionally and globally. Employment opportunities for business administration majors are significant as business-related activities and administrative functions are needed in every type of business and organization, whether for-profit or not-for-profit. Major job categories include business operations, business analyst, human resource management, product/service management, retail management, small business owner, and entrepreneurship venture.

Minor in Business Administration

A minor in business administration can be a perfect choice for students with non-business majors who want to enhance their marketability through business knowledge and skills. The curricular details are available at https://www.ndsu.edu/business/programs/. This minor is not available to students with majors in the College of Business.

The College

In addition to the business administration major, the College of Business offers undergraduate majors in accounting, finance, global business (second major only), management, management information systems, marketing, and supply chain management, as well as several minors and certificate programs. Details about undergraduate minors and certificate programs are available at https://www.ndsu.edu/business/programs/undergraduate/. The College of Business also offers six graduate programs including Master of Business Administration, MBA in Agribusiness, Master of Accountancy, Master of Science in Business Analytics, Master of Supply Chain Management, and a Doctorate in Transportation and Logistics, as well as several graduate certificate programs. Details about graduate certificate programs can be found at https://www.ndsu.edu/business/programs/graduate/graduate_certificates/.

High School Preparation

It is recommended that high school students interested in studying business administration at the university level take mathematics courses at least through pre-calculus. High school electives in the social sciences, communication, and English also would be beneficial. Students who have satisfactorily completed Advanced Placement courses in Calculus, Economics, English, Communication, and Psychology or Sociology may directly apply for admission to the major. Please speak with a professional advisor in the College of Business for more information.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	3	COMM 110	3
MATH 144	4	ENGL 120	3
PSYC 111	3	TL 116	3
ECON 201	3	ECON 202	3
Gen Ed Wellness	2	Free Elective	3
	15		**15**

Sophomore				
Fall	**Credits**		**Spring**	**Credits**
ACCT 200		3	ACCT 201	3
PHIL 216		3	STAT 331	2
SOC 110		3	Gen Ed Humanities & Fine Arts	3
STAT 330		3	Gen Ed Science & Technology (w/ lab)	4
Gen Ed Science & Technology		3	Free Elective	3
		15		**15**
Junior				
Fall	**Credits**		**Spring**	**Credits**
ENGL 320		3	BUSN 430	3
FIN 320		3	MIS 320	3
MGMT 320		3	BUSN 340	3
MRKT 320		3	MGMT 470	3
Gen Ed Cultural Diversity		3	300-400 Level Business Elective (1 course)[1]	3
		15		**15**
Senior				
Fall	**Credits**		**Spring**	**Credits**
BUSN 431		3	BUSN 489	3
300-400 Level Business Electives (3 courses)[1]		9	300-400 Level Business Electives (3 courses)[1]	9
Free Elective		3	300-400 Level Elective (1 course)	3
		15		**15**

Total Credits: 120

1

These twenty-one (21) 300-400 level credits must include at least three different College of Business prefixes: BUSN, MGMT, MRKT, ACCT, FIN, MIS, ENTR (includes courses cross-listed with these prefix courses). Also allowed for this elective area are: SCM 320, SCM 460, and SCM 462

Note:

- Business Administration majors can pursue a supply chain management track as part of their program, provided that the 300-400 level business and free electives taken meet the track requirements.

Business Administration

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  B.S.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/business-administration/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/business-administration/#planofstudytext)

Major Requirements

Major: Business Administration

Degree Type: B.S.
Minimum Credits Required for Degree: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

All courses taken for the Business Administration Major require a grade of C or better. A minimum 2.5 cumulative GPA is required for admission to the major program, to enroll in 300-400 level courses and to graduate.

Code	Title	Credits
Pre-Major Requirements		
COMM 110	Fundamentals of Public Speaking	3
ECON 201	Principles of Microeconomics	3
or ECON 202	Principles of Macroeconomics	
ENGL 120	College Composition II	3
MATH 144	Mathematics for Business	4
PSYC 111	Introduction to Psychology	3
or SOC 110	Introduction to Sociology	
Total Credits		**16**

Code	Title	Credits
Business Administration Major Requirements		
ACCT 200	Elements of Accounting I	3

ACCT 201	Elements of Accounting II	3
TL 116	Business Software Applications	3
PHIL 216	Business Ethics	3
STAT 330	Introductory Statistics	3
STAT 331	Regression Analysis	2
ECON 201	Principles of Microeconomics [1]	3
or ECON 202	Principles of Macroeconomics	
PSYC 111	Introduction to Psychology [1]	3
or SOC 110	Introduction to Sociology	
ENGL 320	Business and Professional Writing	3
Admission to the major program required prior to taking the following courses:		
FIN 320	Principles of Finance [2]	3
MGMT 320	Foundations of Management [2]	3
MRKT 320	Foundations of Marketing [2]	3
MIS 320	Management Information Systems [2]	3
BUSN 430	Legal and Social Environment of Business [2]	3
BUSN 489	Strategic Management [2]	3
BUSN 340	International Business	3
BUSN 431	Business Law I-Contracts, Property and Torts	3
MGMT 470	Entrepreneurship/Small Business Management	3
Business Administration Electives (300 - 400 level)		
These twenty-one (21) 300-400 level credits must include at least three different College of Business prefixes: BUSN, MGMT, MRKT, ACCT, FIN, MIS, ENTR (includes courses cross-listed with these prefix courses). Also allowed for this elective area are: SCM 320, SCM 460, and SCM 462.		21
Business Administration Elective (300-400 level)		
This 300-400 level elective can be external to the CoB and must be satisfied with a single 3-credit 300-400 level course (includes courses cross-listed with CoB prefix courses). It cannot be used to satisfy other requirements.		3
Total Credits		**77**

1

Take the second course of the pair, which was not taken for admission to the major program.

2

Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and Notes

- Students follow the published curricula for the business administration program of study from the semester/year of entrance in the College of Business (CoB) to graduation, provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major are subject to meeting the curricular requirements in effect at the time the new major is declared.
- The CoB accepts a maximum of up to (but not including) 50% of upper-division (300-level and 400-level) business courses[A] required for degree completion, with a minimum grade of C[B]. All transfer courses are subject to approval by the course discipline chair or designated representative.

  A. Defined as courses with the following prefixes: ACCT, BUSN, ENTR, FIN, MGMT, MIS, MRKT, SCM.

  B. Credits that do not qualify for degree completion will still be accepted as general credits towards graduation, within the restrictions defined by university policy.

- Admission to the business administration major is required to enroll in advanced 300 or 400 level CoB courses.
- A grade of 'C' or better is required in transfer courses accepted for all accounting, business administration, finance, management, management information systems, and marketing courses.
- No courses for the major may be taken with Pass/Fail grading.
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- Students must be accepted to the Business Administration major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- For multiple majors within CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.
- Internship and cooperative education credits may be applied toward the total credits required for graduation as non-major electives.
- Student may choose to take the Supply Chain Management Track within the Business Administration major.

Supply Chain Management Track

Code	Title	Credits
SCM 320	Integrated Supply Chain Management	3
SCM 462	Modeling the Supply Chain	3
Select two of the following:		6
AGEC 378	Introduction to Transportation & Logistics	
MGMT 451	Negotiations	
MRKT 430	Sales and Personal Selling	
MRKT 438	Customer Relationship Management (CRM) and Sales Technology	
MRKT 460	Marketing Strategy	
SCM 460	Production & Operations Management	
Total Credits		**12**

Minor Requirements

Minor: Business Administration

Minimum Credits: 24

Minor Requirements

Code	Title	Credits
Requirements		
Select one of the following:		3
ACCT 102	Fundamentals of Accounting	
ACCT 200	Elements of Accounting I	
Select one of the following:		3
ECON 105	Elements of Economics	
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	
Select two of the following:		6
FIN 320	Principles of Finance	
MGMT 320	Foundations of Management	
MRKT 320	Foundations of Marketing	
Elective Courses [1]		12
BUSN 300-400 Level		
FIN 300-400 Level		
MGMT 300-400 Level		
MRKT 300-400 Level		
ENTR 300-400 Level		
MIS 320	Management Information Systems	
SCM 320	Integrated Supply Chain Management	
SCM 460	Production & Operations Management	
SCM 462	Modeling the Supply Chain	
May also include courses cross-listed with College of Business course at the 300-400 level		
Total Credits		**24**

1 The following courses are excluded from the 300-400 level electives: BUSN 413, and ENTR 496.

Minor Requirements and Notes

- This minor is not available to students with majors in the College of Business.
- To enroll in 300/400 level college of business courses, students must have 2.5 minimum institutional cumulative GPA.
- Departmental approval is required for any course (including Tri-College) NOT completed at NDSU and used to satisfy the minor requirements (6 credits maximum).

- Students must earn a 2.50 minimum GPA, which is based upon the courses used to satisfy the minor requirements. Minors must satisfy all course prerequisites.

Business Analytics

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/business-analytics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/business-analytics/)

The Business Analytics Certificate is designed for those students who wish to prepare themselves for professional careers in data science or business analytics. Business analytics is the practice of transforming data into insights for making informed decisions in a business setting. The certificate equips students with skills to develop actionable decisions or recommendations for actions based on insights from data by applying tools, techniques, and principles of analytics to solve complex business problems. Examples of career opportunities include operations analyst, marketing analyst, financial analyst, business analyst, and data scientist.

Business Analytics

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/business-analytics/ (http://catalog.ndsu.edu/programs-study/business-analytics/)

Certificate Requirements

Business Analytics

Minimum Credits: 15

Code	Title	Credits
BUSN 380	Business Analytics: Business Problem Solving with Spreadsheets	3
TL 116	Business Software Applications	3
MIS 320	Management Information Systems	3
MIS 340	Applied Business Intelligence	3
MIS 479	Business Data Mining and Predictive Analytics	3
Total Credits		**15**

Business Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/business-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/business-education/)

Business education is a multi-disciplinary program that will prepare teacher candidates to be licensed as a business education teacher. The plan of study encompasses coursework from teacher education, business, computer sciences, and communication departments. The business education major includes a broad range of content and professional education courses so that teacher candidates fully understand (a) the discipline of business

education, (b) current theories of adolescent development, and (c) current best practices in middle and secondary instruction. Teacher candidates also apply their knowledge and build their teaching skills during multiple clinical experiences in local schools.

THE PROGRAM

Candidates in the business education major are prepared to teach students in grades 5-12 with creativity and confidence. Teacher candidates will gain knowledge and skills in business, management, marketing, accounting, computing, software development, web design, and database systems. Our professional education courses prepare teacher candidates to incorporate active learning strategies, create effective methods for assessment, and adjust instruction to accommodate diverse learners.

PROFESSIONAL EDUCATION COURSES

Teacher candidates may enroll in the 300-level professional education courses before being formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, teacher candidates must complete the application for admission to the SOE; attain at least a 2.75 grade point average in overall course work and education courses. Teacher candidates must also pass the Praxis Core Academic Skills for Educators exam or meet minimum scores on the ACT+. Additional requirements for admission are available on the **School of Education website**.

STUDENT TEACHING

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

STUDENT ADVISEMENT

An academic advisor works individually with Business Education majors to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to seek their advisor's help whenever needed.

LICENSURE

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

CAREER OPPORTUNITIES

Business teachers are in high demand across the country, so our graduates usually obtain full-time employment in school districts shortly after graduation. In addition to teaching careers, business education graduates can choose to seek advanced degrees in business or obtain careers as corporate trainers, managers, or entrepreneurs. Many options are available because a business education degree effectively teaches students to think critically, synthesize information, write and speak clearly and concisely, and to work effectively on teams.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	3	BUSN 280	3
ACCT 102	3	CSCI 122 or 160	3 or 4
COMM 110	3	ENGL 120	3
CSCI 105	3	EDUC 321	3
Humanities/Fine Arts Gen Ed	3	TL 116	3
	15		**15-16**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
ACCT 200	3	COMM 308	3
ECON 105	3	EDUC 322	3
H&CE 232	3	MGMT 320	3

MRKT 320	3	Science and Technology w/lab Gen Ed	4
Humanities & Fine Arts/Cultural Diversity Gen Ed	3	Wellness Gen Ed	2
Apply to School of Education			
Complete Core Academic Skills Exam or access your ACT+ scores			
	15		**15**

Third Year			
Fall	**Credits**	**Spring**	**Credits**
BUSN 340	3	BUSN 430	3
COMM 260	3	COMM 261	3
EDUC 451	3	EDUC 489	3
MGMT 470	3	ENGL 320	3
MIS 315	3	MIS 320	3
		Business elective	3
	15		**18**

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 481 (Business Methods)	3	EDUC 485	1
EDUC 486	3	EDUC 487	9
H&CE 467	3	EDUC 488	3
MRKT 320	3		
Elective Business Admin minor	3		
Science and Technology Gen Ed	3		
Apply to student teach			
Complete Subject Assessment exam (Praxis II)			
Complete Principles of Learning and Teaching exam (7-12)			
	18		**13**

Total Credits: 124-125

Business Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/business-education/ (http://catalog.ndsu.edu/programs-study/undergraduate/business-education/)

Major: Business Education

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
ACCT 102	Fundamentals of Accounting	3
ACCT 200	Elements of Accounting I	3
BUSN 280	Introduction To Business	3
BUSN 340	International Business	3
BUSN 430	Legal and Social Environment of Business	3
CSCI 105	Introduction to Cybersecurity	3
CSCI 122	Visual BASIC	3
or CSCI 160	Computer Science I	
COMM 260	Introduction to Web Design	3
COMM 261	Introduction to Web Development	3
COMM 308	Business and Professional Speaking	3
ECON 105	Elements of Economics	3
ENGL 320	Business and Professional Writing	3
H&CE 232	Philosophy and Policy	3
MRKT 320	Foundations of Marketing	3

MGMT 320	Foundations of Management	3
MGMT 470	Entrepreneurship/Small Business Management	3
MIS 315	System Analysis and Design	3
MIS 320	Management Information Systems	3
TL 116	Business Software Applications	3
Additional 300-400 Business Elective: Select two courses from the following:		6
MRKT 410	Consumer Behavior	
MRKT 420	Advertising and Integrated Marketing Communication	
MRKT 465	Digital Marketing	
MGMT 330	Foundations of Organizational Behavior	
MGMT 430	Leadership in Organizations	
MGMT 451	Negotiations	
MGMT 453	Understanding and Managing Diversity in Organizations	
MGMT 472	Managing Family Enterprises	
Teaching Specialty Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I:	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
H&CE 467	Leading Youth Organizations	3
Total Credits		**97**

Degree Notes:

- This degree plan will allow students to earn a Business Administration minor by completing the following courses totaling 24 credits: ACCT 102, ECON 105, MRKT 320, MGMT 320, MGMT 470, BUSN 340, BUSN 430, and MIS 320. This minor requires a minimum GPA of 2.5 in the courses that make up the minor. Students must officially declare this minor through the Office of Registration and Records to ensure the credential is posted to record.
- A grade of 'C' or better is required in all courses with an EDUC prefix.
- 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.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.

Certificate of Completion: First-Year Spanish

Department Information

- **Department Web Site:**
  www.ndsu.edu/modernlanguages/about/languages/spanish/ (http://www.ndsu.edu/modernlanguages/about/languages/spanish/)
- **Credential Offered:**
  Certificate of Completion
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/first-year-spanish/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/first-year-spanish/)

This certificate will allow students to prove a basic understanding of Spanish (A2 Level on CEFR scale) and will benefit them in their job search and employment.

Certificate of Completion: First-Year Spanish

Department Information

- **Department Web Site:**
  www.ndsu.edu/modernlanguages/about/languages/spanish/ (http://www.ndsu.edu/modernlanguages/about/languages/spanish/)
- **Credential Offered:**
  Certificate of Completion
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/first-year-spanish/ (http://catalog.ndsu.edu/programs-study/undergraduate/first-year-spanish/)

Certificate of Completion Requirements

First Year Spanish

Required Credits: 8

Code	Title	Credits
Required Courses		
SPAN 101	First-Year Spanish I	4
SPAN 102	First-Year Spanish II	4
Total Credits		**8**

Certificate Eligibility:

- Students must declare this Certificate of Completion with the Office of Registration and Records; it is not automatically earned by completing the two classes.
- Both courses must be completed at NDSU. Students with transfer credit for either of the classes will not be eligible for this certificate.
- Both courses must be completed with a grade of B or higher.
- For other information about a Certificate of Completion, please see the Degree Types (https://catalog.ndsu.edu/academic-policies/degree-and-graduation/#text) information in the online University Catalog.

Certificate of Completion: Second-Year Spanish

Department Information

- **Department Web Site:**
  www.ndsu.edu/modernlanguages/about/languages/spanish/ (http://www.ndsu.edu/modernlanguages/about/languages/spanish/)
- **Credential Offered:**
  Certificate of Completion
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/second-year-spanish/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/second-year-spanish/)

This certificate will allow students to prove an intermediate (B1 Level on CEFR scale) understanding of Spanish and will benefit them in their job search and employment.

Certificate of Completion: Second-Year Spanish

Department Information

- **Department Web Site:**
  www.ndsu.edu/modernlanguages/about/languages/spanish/ (http://www.ndsu.edu/modernlanguages/about/languages/spanish/)
- **Credential Offered:**
  Certificate of Completion
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/second-year-spanish/ (http://catalog.ndsu.edu/programs-study/undergraduate/second-year-spanish/)

Certificate of Completion Requirements

Second Year Spanish

Required Credits: 6

Code	Title	Credits
SPAN 201	Second-Year Spanish I	3
SPAN 202	Second-Year Spanish II	3
Total Credits		**6**

Certificate Eligibility:

- Students must declare this Certificate of Completion with the Office of Registration and Records; it is not automatically earned by completing the two classes.
- Both courses must be completed at NDSU. Students with transfer credit for either of the classes will not be eligible for this certificate.
- Both courses must be completed with a grade of B or higher.
- For other information about a Certificate of Completion, please see the Degree Types (https://catalog.ndsu.edu/academic-policies/degree-and-graduation/#text) information in the online University Catalog.

Certificate of Completion: Third-Year Spanish

Department Information

- **Department Web Site:**
  www.ndsu.edu/modernlanguages/about/languages/spanish/ (http://www.ndsu.edu/modernlanguages/about/languages/spanish/)
- **Credential Offered:**
  Certificate of Completion
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/third-year-spanish/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/third-year-spanish/)

This certificate will allow students to prove an advanced - intermediate (B1+/B2 Level on CEFR scale) understanding of Spanish and will benefit them in their job search and employment.

Certificate of Completion: Third-Year Spanish

Department Information

- **Department Web Site:**
  www.ndsu.edu/modernlanguages/about/languages/spanish/ (http://www.ndsu.edu/modernlanguages/about/languages/spanish/)
- **Credential Offered:**
  Certificate of Completion
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/third-year-spanish/ (http://catalog.ndsu.edu/programs-study/undergraduate/third-year-spanish/)

Certificate of Completion Requirements

Third Year Spanish

Required Credits: 6

Code	Title	Credits
SPAN 311	Spanish Conversation and Composition I	3
SPAN 312	Spanish Conversation and Composition II	3
Total Credits		**6**

Certificate Eligibility:

- Students must declare this Certificate of Completion with the Office of Registration and Records; it is not automatically earned by completing the two classes.

- Both courses must be completed at NDSU. Students with transfer credit for either of the classes will not be eligible for this certificate.
- Both courses must be completed with a grade of B or higher.
- For other information about a Certificate of Completion, please see the Degree Types (https://catalog.ndsu.edu/academic-policies/degree-and-graduation/#text) information in the online University Catalog.

Chemistry

Department Information

- **Department Web Site:**
  www.ndsu.edu/chemistry/ (http://www.ndsu.edu/chemistry/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/chemistry/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/chemistry/)

The chemistry undergraduate major and its specialized options at North Dakota State University provides opportunities for personal achievement and professional training that are typically not available at many universities. Faculty teach all major courses. Students use state#of#the#art instrumentation in their laboratory courses. Many students get involved in fundamental and applied research with faculty research groups and have growth experiences commonly available only to graduate students. Future secondary chemistry and science teachers can participate in supervised laboratory teaching and peer mentoring programs.

Background Information

Industry and graduate schools are well aware of the quality of the undergraduate education at NDSU and actively seek out our graduates. Scholarships, fellowships and employment in research groups or in supervised teaching activities can cut the already modest cost of an NDSU education by one#half or more.

The Program

The Department of Chemistry and Biochemistry is fully accredited by the American Chemical Society (ACS) and offers programs leading to an ACS#certified Bachelor of Science degree. Options in biochemistry or coatings and polymeric materials can be added to the curriculum. A pre-professional option for those planning on medical, dental and other professional schools is also available. A chemistry major may be combined with secondary school teacher certification with as little as one additional semester for student teaching.

The prescribed curriculum provides a solid grounding through classroom and laboratory work in all of the main areas of chemistry. Major laboratory courses are designed to utilize the latest synthesis and characterization methods and employ advanced, computer-interfaced instrumentation.

Our pre-professional option includes the course work in biological and biochemical sciences that easily meets the requirements of medical, dental and other health#related professional schools. A chemistry major offers rigorous pre-professional education, as well as a back-up option in case career plans change in the future.

Research Opportunities

Almost every chemistry faculty member is heavily involved in forefront research, and undergraduates are encouraged to participate in that research. Students gain important skills and are exposed to the excitement of the hunt for new knowledge. This research experience often helps students define career goals more sharply.

Career Opportunities

People often think of the professional chemist as one who stands at a workbench in an industrial laboratory carefully manipulating chemicals or instruments. A lot of chemists are employed this way. This is often quite satisfying since many people are drawn to chemistry because they enjoy laboratory work. There are, however, many other tasks besides laboratory research in which a chemist may engage, and many different careers for which he or she can prepare for a degree in chemistry. A chemist may be employed in government, business, industry or education. Besides basic and applied research (the lab bench), an industrial chemist may be involved in production, technical service (assisting people who use products), national and international marketing and sales, or management and corporate planning. Some chemists prefer self#employment through small business or consulting firms.

Analytical chemists are in demand for services to other departments within a chemical company, for quality control in large and small concerns, and for environmental monitoring by industrial, governmental and private organizations. Organic chemists, also in great demand, study new pharmaceuticals, polymers and other compounds. Materials chemists are needed by all high#tech industries for their synthesis and characterization skills. Inorganic chemists work on the full range of synthesis, characterization and application of chemical compounds. Physical chemists model chemical structures and reactions, and design experiments and equipment to study them. The Department of Chemistry and Biochemistry offers specialized education and training in each of these fields.

A degree in chemistry can serve as excellent preparation for careers in medicine, dentistry and other health professions. A chemistry degree also can lead to law school, and perhaps a career in patent law, a very demanding and in#demand technical profession. About half of NDSU's chemistry graduates go on to graduate or professional schools. Almost all the rest go directly into industry. Average entry-level salaries for chemistry graduates is $45,300 to $81,400, based on 2016 data from www.payscale.com (http://www.payscale.com). For chemists who have advanced degrees, salary and opportunities are often much greater.

Faculty and Facilities

The Department of Chemistry and Biochemistry has 17 faculty members. All of the faculty have doctorate degrees from leading universities.

Most of the Department of Chemistry and Biochemistry's teaching and research facilities are located in Sugihara Hall, which opened in 2022. Some additional teaching laboratories are located in the A. Glenn Hill Center, and biochemistry research labs are in the Quentin Burdick Building. Students are trained in the use of state#of#the#art equipment, some of which is duplicated at only a few sites in the world. Some undergraduate students are trained to use several powerful and sophisticated laser systems, and some have even built lasers that were put directly to work on research projects. Nuclear magnetic resonance spectrometry, X-ray diffraction and fluorescence are as up#to#date as one would expect to find at any major research university. Theoretical chemistry researchers use some of the most powerful computers on the NDSU campus.

High School Preparation

Ideal high school preparation for a chemistry major includes four years each of English and mathematics, and a year each of biology, chemistry and physics. Experience with personal computers is also desirable. Strong writing and communication skills are as important to success in chemistry as they are in any technical field.

Financial Support

A number of endowed scholarships and fellowships are available to highly qualified applicants. The Department of Coatings and Polymeric Materials offers industry#funded scholarships and fellowships to chemistry majors interested in taking the coatings and polymeric materials option. In addition, more than half of the students majoring in chemistry are engaged in research and earning substantial portions of their living expenses. Financial support for research experiences is provided principally by grants and contracts of faculty researchers, various summer Research Experiences for Undergraduates (SURE) programs, and national scholarship and fellowship programs, such as the Goldwater Foundation. Since 1992, nine students in the department have been awarded Goldwater Fellowships, which cover all educational expenses. Students interested in secondary school teaching have additional funding opportunities as laboratory teaching assistants and discussion leaders in a peer#tutoring program known as Supplemental Instruction. These positions not only provide an opportunity for help toward meeting expenses but also in adding relevant experience to resumes.

Sample Program Guide

B.S. Chemistry, ACS Certified

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110		3	ENGL 120	3
CHEM 121 & CHEM 160		4	COMM 110	3
MATH 165		4	MATH 166	4
BIOL 150		3	CHEM 122 & CHEM 161	4
Gen Ed Social & Behavioral Sci and Cultural Diversity		3	Gen Ed Humanities and Fine Arts	3
		17		**17**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
CHEM 341		3	CHEM 342	3
CHEM 353		1	CHEM 354	2
MATH 128		1	MATH 266	3

MATH 259	3	PHYS 252 & 252L	5
PHYS 251 & 251L	5	Gen Ed Wellness	2
Gen Ed Humanities & Fine Arts and Global Perspectives	3		
	16		**15**

Third Year

Fall	Credits	Spring	Credits
CHEM 431 & 431L	5	CHEM 365	3
CHEM 364	3	CHEM 380	1
ENGL 324	3	Electives	9
Gen Ed Social and Behavioral Sci	3	CHEM 471	2
	14		**15**

Fourth Year

Fall	Credits	Spring	Credits
BIOC 460 & 460L	4	CHEM 491	2
Free Electives	6	CHEM 432 & 432L	4
CHEM 425	3	Free Electives	5
CHEM 429	2		
	15		**11**

Total Credits: 120

Chemistry

Department Information

- **Department Web Site:**
  www.ndsu.edu/chemistry/ (http://www.ndsu.edu/chemistry/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/chemistry/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/chemistry/#planofstudytext)

Major Requirements

Major: Chemistry

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.

7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Code	Title	Credits
Chemistry Core Requirements		
Select one from the following:		4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
Select one from the following:		4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 341	Organic Chemistry I	3
CHEM 342	Organic Chemistry II	3
CHEM 353	Majors Organic Chemistry Laboratory I	1
CHEM 354	Majors Organic Chemistry Laboratory II	2
CHEM 364	Physical Chemistry I	3
CHEM 365	Physical Chemistry II	3
CHEM 380	Chemistry Junior Seminar	1
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory	5
CHEM 471	Physical Chemistry Laboratory (Not required for Pre-professional and Chemistry Education options.)	2
BIOC 460	Foundations of Biochemistry and Molecular Biology I [1]	3

BIOC 460L		1
CHEM 491	Seminar	2
ENGL 321	Writing in the Technical Professions	3
or ENGL 324	Writing in the Sciences	
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	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
Program Option		
Select one of the five options listed below to complete the major.		13-35
Total Credits		**75-97**

Option 1: ACS Certified Chemistry

Code	Title	Credits
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory [1]	6
CHEM 432 & 432L	Analytical Chemistry II and Analytical Chemistry II Laboratory [1]	4
MATH 266	Introduction to Differential Equations	3
Total Credits		**13**

Option 2: ACS Certified w/Biochemistry Option

Code	Title	Credits
BIOC 461	Foundations of Biochemistry and Molecular Biology II [1]	3
BIOC 473	Methods of Biochemical Research [1]	4
BIOC 474	Methods of Recombinant DNA Technology	4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory [1]	6
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	
MICR 352	Critical Skills in Microbiology	
BIOL 370	Cell Biology	
Total Credits		**35**

Option 3: Coating & Polymeric Materials

Code	Title	Credits
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory [1]	6
CHEM 471	Physical Chemistry Laboratory	2
CHEM 432 & 432L	Analytical Chemistry II and Analytical Chemistry II Laboratory [1]	4
CPM 473	Polymer Synthesis	3
CPM 474 & CPM 484	Applied Polymer Science and Coatings I Laboratory	5

CPM 475 & CPM 485	Coatings' Materials Science and Coatings II Laboratory	5
MATH 266	Introduction to Differential Equations	3
Total Credits		**28**

Option 4: Pre-Professional Option

Code	Title	Credits
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 425	Inorganic Chemistry I [1]	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.

Code	Title	Credits
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 425	Inorganic Chemistry I [1]	3
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
MATH 266	Introduction to Differential Equations	3
or STAT 330	Introductory Statistics	
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**

Program Notes:

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Accelerated Program Notes:

- This major is eligible as an accelerated program for the student to earn a B.S./B.A. in Chemistry and a M.S. in Chemistry. Students may complete either a thesis or non-thesis option in the master's program.

1

Students in the accelerated program may substitute the 600 level course equivalent to use in both the undergraduate and graduate degree programs. **No more than 15 credits of 600 level coursework can apply to the undergraduate degree program.**

Minor Requirements

Minor: Chemistry

Required Credits: 19

Minor Requirements

Code	Title	Credits
Required Courses		
CHEM 121	General Chemistry I	3
CHEM 121L	General Chemistry I Laboratory	1
CHEM 122	General Chemistry II	3
CHEM 122L	General Chemistry II Laboratory	1
Electives		**11**
300-400 level courses in chemistry, biochemistry, or coatings & polymeric materials; one lab course required.		
Total Credits		**19**

Minor Requirements and Notes

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

Chemistry Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/chemistry-education/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/chemistry-education/#planofstudytext)

Major Requirements

Major: Chemistry Education

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 136

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**

Category A: Humanities and Fine Arts [†]	**6**
Category B: Social and Behavioral Sciences [†]	**6**
Category W: Wellness [†]	**2**
Category D: Cultural Diversity [*†]	
Category G: Global Perspectives [*†]	
Total Credits	**39**

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

major Requirements

Code	Title	Credits
Teaching Specialty Requirements		
BIOC 260	Elements of Biochemistry	4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
Pick an introductory chemistry sequence		8
Sequence A:		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Sequence B:		
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	4
CHEM 425	Inorganic Chemistry I	3
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory	5
CHEM 465	Survey of Physical Chemistry	4
ENGL 324	Writing in the Sciences	3
MATH 165	Calculus I	4
MATH 166	Calculus II	4
STAT 330	Introductory Statistics	3
Pick one of the following:		4
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	
Pick one of the following sequences:		8-12
Sequence A:		
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	
Sequence B:		

PHYS 251 & 251L & 251R	University Physics I and University Physics I Laboratory and University Physics I Recitation	
PHYS 252 & 252L & 252R	University Physics II and University Physics II Laboratory and University Physics II Recitation	
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Science)	3
EDUC 482	Classroom Practice/Methods of Teaching II: (Science)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		**96-100**

Degree Requirements and Notes

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

Chemistry Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/chemistry-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/chemistry-education/)

Chemistry involves the study of the composition, structure, properties and interactions of matter. Chemistry is often considered a central or enabling science, because it is foundational to understanding other scientific disciplines. Teaching chemistry in middle and secondary schools requires deep knowledge of (a) science content, (b) current theories of adolescent development, and (c) current best practices in secondary instruction. Accordingly, the chemistry education major combines coursework in chemistry and related sciences with professional education courses on teaching and learning.

The Program

Candidates in chemistry education are prepared to teach students in grades 5-12 with skill and confidence. The program is designed to develop science content knowledge as well as proficiency in a range of science-related skills and laboratory practices. Our professional education courses prepare teacher candidates to incorporate active learning strategies, create effective methods for assessment, and adjust instruction to accommodate diverse learners. Teacher candidates also apply their knowledge and build their teaching skills during multiple clinical experiences in local schools.

Professional Education Courses

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

Student Teaching

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

Student Advisement

Chemistry education teacher candidates are assigned to academic advisors who work closely with them to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to meet with their advisor at least once every semester, as well as whenever needed.

licensure

Upon completing this program, teacher candidates are eligible for teacher licensure in most states. Teacher candidates who take the Praxis Subject Assessment exam for Chemistry will be licensed to teach Chemistry and related high school courses, as well as middle school sciences. Teacher candidates who choose to take the Praxis Subject Assessment exam for General Science will be licensed to teach all areas of middle school and high school science. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education and Standards Practices Board (ESPB).

Career OPPORTUNITIES

Science teachers are in high demand across the country, so our graduates usually obtain full-time employment in school districts shortly after graduation.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 150	3	COMM 110	3
BIOL 150L	1	ENGL 120	3
ENGL 110	3	CHEM Lecture & Lab Sequence A or B[1]	4
GEOL 105 & 105L	4	Humanities & Fine Arts & Global Perspectives Gen Ed	3
CHEM Lecture & Lab Sequence A or B[1]	4	Social & Behavioral Science Gen Ed	3
	15		**16**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CHEM 341 & 341L	4	CHEM 342 & 342L	4
EDUC 321	3	EDUC 322	3
MATH 165	4	MATH 166	4
PHYS 211 & 211L	4	PHYS 212 & 212L	4
Wellness Gen Ed	2	Apply to the School of Education	
Complete Core Academic Skills Exam or access your ACT+ scores			
	17		**15**

Third Year				
Fall	**Credits**		**Spring**	**Credits**
CHEM 465		4	BIOC 260	4
EDUC 451		3	CHEM 425	3
STAT 330		3	EDUC 475	2
Social & Behavioral Science & Cultural Diversity Gen Ed		3	EDUC 481	3
Humanities & Fine Arts Gen Ed		3	EDUC 486	3
		16		**15**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
CHEM 431 & 431L		5	EDUC 485	1
EDUC 482		3	EDUC 487	9
EDUC 489		3	EDUC 488	3
ENGL 324		3		
Apply for Student Teaching				
Complete PLT (grades 7-12) Exam				
Complete Subject Area Assessment Exam				
		14		**13**

Total Credits: 121

*

One of these General Education courses needs to be selected from Category D - Cultural Diversity.

1

Students need to pick one introductory chemistry sequence:
CHEM 121 & 121L and CHEM 122 & 122L or CHEM 150 & 160 and CHEM 151 & 161

Civil Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/ccee/ (http://www.ndsu.edu/ccee/)
- **Credential Offered:**
  B.S.C.E.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/civil-engineering/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/civil-engineering/)

Civil engineers are professionals who have broad technical knowledge, possess strong problem-solving skills, and enjoy working with people. The civil engineers work is directly related to public well-being and safety and has a significant impact on decision-making and planning processes. Civil engineers design solutions for the infrastructure of society and the environment in which we live.

Projects may include designing structures such as buildings, bridges, and sports stadiums; transportation infrastructure such as highways, railroads, pipelines, waterways, ports, and airports; water infrastructure like pipes, dams, and drainage; safe drinking water supply and waste systems; and averting damage from earthquakes, landslides and floods. The profession embraces new technologies such as nanotechnology, smart materials, sensors, robotics, etc. that are introduced into civil engineering projects to improve reliability, cost-effectiveness, and quality of life.

NDSU civil engineering graduates apply their skills in all fields of the profession domestically and abroad. With a strong and balanced technical and general education curriculum, they are highly sought by companies from all over the country at competitive salaries. The Bachelor of Science in Civil Engineering program is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the commission's General Criteria and Program Criteria for Civil and Similarly Named Engineering Programs. In addition, a new 4+1 accelerated Master's degree in

civil engineering started in Fall 2021, which provides a path for excellent undergraduate students to complete a BS degree in the department and a Master's degree in Civil Engineering in 5 years.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

The following program educational objectives are consistent with the university, college and department missions. Graduates of our BS program in Civil Engineering program are expected within a few years of graduation to:

1. Engage successfully in the practice of engineering to solve current and emerging problems.
2. Conduct design in a manner that is ethical, includes diverse perspectives, and realizes the broader societal and sustainability implications of the design and decision-making process.
3. Ascend to leadership roles within the workplace via initiative and responsible stewardship
4. Advance their profession and communities through collaborative work, professional licensure, advanced degrees, lifelong learning, and engaged service.

STUDENT OUTCOMES (SO)

When graduated, students in the Civil Engineering program will have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

CURRICULUM

First-year civil engineering students at NDSU begin their education with fundamental courses in English, chemistry, mathematics, and an introduction to the engineering sciences. Second-year courses become more specific with an emphasis on surveying, mathematics, physics, and engineering science courses. The third-year students preview the specialization areas of civil engineering. These are (1) environmental engineering, (2) geotechnical, (3) structural, (4) transportation, and (5) water resources. The senior year continues to require certain courses but also provides 12 hours of technical electives and a senior design project. The technical electives allow the student to take additional courses in those areas of civil engineering in which she/he/they intend to practice professionally. Currently, there are 51 core civil engineering and technical elective courses from which the student may choose.

Accelerated PROGRAM

The accelerated program provides opportunities for current students in the Civil Engineering program to complete a Master's degree in Civil Engineering (MSCE) in 5 years (one additional year beyond the BS degree). The accelerated Master's program requires at least a total of 30 semester credits. Up to 9 credits (three courses) from the Civil Engineering BS program can be double counted to the MSCE program. However, these courses must be taken at the 600- or 700-level. In that sense, the interested students could accelerate the Master's study by reducing three courses, so they could complete the remaining 21 credits plus the completion of the Master's thesis and graduate in one year, while the total and design credit requirements for the technical elective courses stay the same for the Civil Engineering BS degree.

FACULTY

The department has well-qualified and dedicated faculty members. They are nationally and internationally recognized experts, with the knowledge and experience to prepare graduates for successful careers. All faculty members in the department have a doctoral degree. Many are licensed as a Professional Engineer (PE) or Certified Professional Contractor (CPC). In addition, the department has many adjunct faculty members who worked or are currently working in the industry.

FACILITIES

The department has excellent laboratory facilities for undergraduate education across all civil, environmental, and construction areas, including the teaching laboratories for civil engineering materials, construction management and engineering, environmental engineering, geotechnical engineering, structural engineering, transportation engineering, and water resources engineering, . Students also have access to computer clusters and many state-of-the-art research laboratories.

STUDENT ORGANIZATIONS

Students participate in various professional student organizations in the department, which helps them develop leadership skills and the ability to work in teams. The major student organizations include: American Indian Science and Engineering Society (AISES), American Railway Engineering and Maintenance-of-Way Association (AREMA), American Society of Civil Engineers (ASCE), American Water Works Association (AWWA), Associated General Contractors of America (AGC), Engineers Without Borders (EWB), Grand Challenge Scholars of NDSU, Habitat for Humanity, Institute of Transportation Engineers (ITE), Materials Research Society (MRS), National Association of Home Builders (NAHB), National Society of Black Engineers (NSBE), Sigma Lambda Chi (ΣΛX), Society of Women Engineers (SWE), and Water Environment Federation (WEF), as well as Steel Bridge, Concrete Canoe, Associated Schools of Construction, Residential Construction Management, GeoWall, and Quiz Bowl competition teams. The student organizations have won several national and regional awards.

PREPARATION

High school students who wish to prepare for some phase of engineering at the college level should attempt to complete the following high school credits: one unit of physics, four units of mathematics, and one unit of chemistry. Incoming freshmen prepared to enroll in calculus frequently complete their civil engineering degree in four years. Transfer students who have studied two years of pre-engineering at another institution typically complete the civil engineering degree in two additional years.

SCHOLARSHIPS AND FINANCIAL AID

The department awards numerous scholarships each year, which mostly range from $500 to $10,000. Students should check with the department for more information. Other forms of financial aid are available through the Office of Financial Aid and Scholarships.

CAREER OPPORTUNITIES

NDSU civil engineers are widely regarded as hands-on, can-do, project-ready graduates, who are very successful in finding excellent jobs. Our students are highly sought for internships and co-ops, with most students having completed multiple work experiences. Most have selected a job before graduation and others within a few weeks of graduation. The work varies with the type of activity and location. Civil engineers can work in the office and/or in the field. They can work primarily on intricate designs or with people in management or sales.

Job placement of recent NDSU civil engineering graduates indicates a variety of work experience. About 40 percent of the graduates have gone to work for consulting engineering firms and another 40 percent with city, state government, and federal governments The remainder are employed by industry, contractors, and the military or have gone to graduate school at NDSU or other universities. Most graduates are involved in more than one type of civil engineering activity. Job placement of graduates seeking employment is 98-100 percent in recent semesters. The starting annual salaries for recent civil engineering graduates were between $65,000 and $85,000. The U.S. Bureau of Labor Statistics projects a 5-percent growth in employment for civil engineers from 2022 to 2032 which is above the average growth rate for all occupations (3 percent).

Graduate programs leading to Master of Science (MS) and Doctor of Philosophy (Ph.D.) degrees are available in specialized fields. For more complete details, see the Graduate Bulletin (http://catalog.ndsu.edu/graduate/) online.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
CE 111	1	CE 112	1
CHEM 121	3	CHEM 122	3
CHEM 121L	1	CHEM 122L	1
ENGL 110	3	COMM 110	3
ENGL 120	3	MATH 166	4
MATH 165	4	ME 221	3
		ENGR 311	3
	15		**18**
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
CE 204	3	IME 460	3

CE 212	3	MATH 266	3
GEOL 105	3	ME 223	3
MATH 128	1	PHYS 252	4
MATH 259	3	Gen Ed Wellness	2
ME 222	3		
	16		**15**

Junior			
Fall	**Credits**	**Spring**	**Credits**
CE 309	3	CE 303	2
CE 316	3	CE 303L	1
ENGL 321	3	CE 343	4
ME 350	3	CE 370	3
ENGR 327	3	CE 371	1
		CE 408	3
		CE 418	4
	15		**18**

Senior			
Fall	**Credits**	**Spring**	**Credits**
CE 310	1	CE 483	3
CE 404	3	CE 489	3
CE 444	3	IME 440	2
Gen Ed Social & Behavioral Sciences	3	Technical Elective	3
Gen Ed Social & Behavioral Sciences and Global Perspectives	3	Technical Elective	3
Technical Elective	2	Technical Elective	2
Technical Elective	2		
	17		**16**

Total Credits: 130

DEGREE NOTES:

- No grades less than a "C" are accepted in any of the math courses.
- 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.

Civil Engineering

Department Information

- **Department Location:**
  201 Civil & Industrial Engineering
- **Department Phone:**
  701-231-7244
- **Department Web Site:**
  www.ndsu.edu/cee/ (http://www.ndsu.edu/cee/)
- **Credential Offered:**
  B.S.C.E.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/civil-engineering/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/civil-engineering/#planofstudytext)

Major Requirements

Major: Civil Engineering

Degree Type: B.S.C.E.
Minimum Credits Required for Degree: 130

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Civil Engineering Core Requirements		
CE 111	Introduction to Civil Engineering	1
CE 112	Computer Applications in Civil Engineering	1
CE 204	Surveying	3
CE 212	Civil Engineering Graphic Communications	3
CE 303	Civil Engineering Materials	2
CE 303L	Civil Engineering Materials Laboratory	1
CE 309	Fluid Mechanics	3
CE 310	Fluid Mechanics Laboratory	1
CE 316	Soil Mechanics	3

CE 343	Structural Engineering and Analysis	4
CE 370	Introduction to Environmental Engineering	3
CE 371	Environmental Engineering Laboratory	1
CE 404	Reinforced Concrete	3
CE 408	Water Resources and Supply	3
CE 418	Transportation Engineering	4
CE 444	Structural Steel Design	3
CE 483	Contracts and Specifications	3
CE 489	Senior Design	3
MATH Courses Required: [1]		
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
Other Required Courses :		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
ENGL 321	Writing in the Technical Professions	3
ENGR 311	History of Technology	3
ENGR 327	Ethics, Engineering, and Technology	3
GEOL 105	Physical Geology	3
IME 440	Engineering Economy	3
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
or ME 351	Thermodynamics I	
PHYS 252	University Physics II	4
Technical Electives Required: Select 12 credits from the following:		**12**
Structures:		
CE 411	Design of Pre-stressed Concrete (Design Credits 1.0)	
CE 425	Bridge Evaluation and Rehabilitation (Design Credits 1.5)	
CE 430	Timber and Form Design (Design Credits 1.5)	
CE 441	Finite Element Analysis (Design Credits 1.0)	
CE 445	Advanced Steel Design (Design Credits 1.0)	
CE 446	Basic Dynamics of Structures (Design Credits 1.0)	
CE 447	Stability of Structures (Design Credits 1.5)	
CM&E 465	Bridge Engineering and Management (Design Credits 1.5)	
Water Resources:		
CE 421	Open Channel Flow (Design Credits 1.5)	
CE 474	Groundwater Sustainability Design (Design Credits 1.5)	
CE 476	Watershed Modeling (Design Credits 1.5)	
CE 477	Applied Hydrology (Design Credits 1.5)	
Environmental:		
CE 410	Water and Wastewater Engineering (Design Credits 1.5)	
CE 471	Environmental Nanotechnology (Design Credits 1.5)	
CE 472	Solid and Hazardous Waste Management (Design Credits 1.5)	
ENVE 473	Air Pollution	

CE 478	Water Quality Management (Design Credits 1.5)
CE 479	Advanced Water and Wastewater Treatment (Design Credits 1.5)
CE 499	Special Topics (Design Credits 1.5)
Transportation:	
CE 419	Pavement Design (Design Credits 1.5)
CE 454	Geometric Highway Design (Design Credits 2.0)
CE 455	Airport Planning and Design (Design Credits 1.0)
CE 456	Railroad Planning and Design (Design Credits 1.5)
CE 457	Pavement Management Systems (Design Credits 1.0)
CE 458	Bituminous Materials and Mix (Design Credits 1.5)
CE 499	Special Topics (Design Credits 1.0)
Geotechnical:	
CE 417	Slope Stability and Retaining Walls (Design Credits 1.5)
CE 461	Foundation Engineering (Design Credits 1.5)
CE 462	Designing with Geosynthetics (Design Credits 1.0)
CE 463	Geotechnical Earthquake Engineering (Design Credits 1.5)
CE 464	Advanced Soil Mechanics (Design Credits 1.0)
Advanced Materials:	
CE 486	Nanotechnology and Nanomaterials (Design Credits 0.0)
CE 491	Seminar
CE 493	Undergraduate Research
Total Credits	**114**

[1]

No grades less than a "C" are accepted in any of the math courses.

Degree Requirements and Notes

- Students must complete courses in a minimum of three technical areas with a minimum of 6 credits in design for a minimum total of 12 technical electives.

Note: *Department permission required for graduate level courses. Credit may be earned only at the undergraduate level. Department permission is also required for some undergraduate courses. There are specific prerequisites and grade requirements to be allowed to take certain courses.*

Coatings and Polymeric Materials

Department Information

- **Department Web Site:**
  www.ndsu.edu/cpm/ (http://www.ndsu.edu/cpm/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/coatings-polymeric-materials/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/coatings-polymeric-materials/)

Everybody uses products that are painted or coated in everyday life, but often take coatings for granted. However, a $100 billion industry exists to supply paints and coatings worldwide that decorate, protect and provide function to automobiles, building, furniture, aircraft, ships, appliances, bridges, medical devices, electronic devices and countless other objects. The performance of these coatings depends critically on specially tailored polymers, which form coating films. Thus, coatings scientists must also be good polymer scientists. Other scientific disciplines are also important to the coatings scientist, such as organic chemistry, electrochemistry, rheology, surface chemistry, chemical analysis, photochemistry, mathematics, physics and several branches of engineering and materials science.

North Dakota State University started offering polymer and coatings chemistry courses in 1905. Of the few universities offering training that focuses on the technology of paints and coatings, NDSU has the longest and most extensive experience. Over the decades, the Department of Coatings and Polymeric Materials has established a worldwide reputation for education and research. Today, there is a high demand for coatings and polymer scientists at all degree levels, providing coatings and polymer materials graduates with abundant job opportunities. NDSU graduates are especially sought after by companies in the paint, coatings, and polymer industries. Graduates of the program are employed by major paint, coatings, polymer,

and chemical companies with many graduates attaining upper management positions. At the undergraduate level, Bachelor of Science degrees in science and engineering with a coatings and polymeric materials minor are offered. Master's and doctoral degrees are available at the graduate level.

Coatings and Polymeric Materials

Department Information

- **Department Web Site:**
  www.ndsu.edu/cpm/ (http://www.ndsu.edu/cpm/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/coatings-polymeric-materials/ (http://catalog.ndsu.edu/programs-study/undergraduate/coatings-polymeric-materials/)

Minor Requirements

Minor: Coatings & Polymeric Materials

Required Credits: 16

Code	Title	Credits
Required Courses:		
CPM 475	Coatings' Materials Science	3
CPM 474	Applied Polymer Science	3
Select one lab course from the following:		1-2
CPM 483	Polymer Practicum	
CPM 484	Coatings I Laboratory	
CPM 485	Coatings II Laboratory	
CPM 487	Corrosion and Materials Laboratory	
Elective Courses: Select 9 credits from the following (if CPM 487 was completed, select 8 credits)		**9**
CHEM 240	Survey of Organic Chemistry [2†]	
CHEM 341	Organic Chemistry I [1†]	
CHEM 341L	Organic Chemistry I Laboratory [1*]	
CHEM 342	Organic Chemistry II [1†]	
CHEM 342L	Organic Chemistry II Laboratory [1*]	
CPM 436	Biopolymers and Biocomposites	
CPM 451	Laboratory, Chemical, Radiation, and Biological Safety	
CPM 472	Environment and Chemical Industries	
CPM 473	Polymer Synthesis [3]	
CPM 483	Polymer Practicum	
CPM 484	Coatings I Laboratory	
CPM 485	Coatings II Laboratory	
CPM 486	Corrosion and Materials	
CPM 487	Corrosion and Materials Laboratory	
Total Credits		**16-17**

1

If CHEM 341 & 341L and CHEM 342 & CHEM 342L are required for a student's major program of study, these credits cannot count toward the CPM minor.

2

If CHEM 240 is required for the student's major degree, the credits cannot also count for the CPM minor.

3

Chemistry and Biochemistry & Molecular Biology majors are required to have CPM 473.

*

CHEM 353 & CHEM 354 can be substituted for CHEM 341L & CHEM 342L.

†
For the CPM minor a student cannot get credit for both CHEM 240 and CHEM 341/342.

Minor Requirements and Notes:

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

Community Development

Department Information

- **Department Web Site:**
  www.ndsu.edu/socanth/ (http://www.ndsu.edu/socanth/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/community-development/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/community-development/)

The Community Development minor is an applied, multidisciplinary minor. The purpose of the minor is to prepare students to integrate community development concepts into their own occupations; to recognize the relationships of social, economic, and development change on community viability and sustainability; and to take a more active role in the affairs of their own communities. The minor consists of 18 credits.

Community Development

Department Information

- **Department Web Site:**
  www.ndsu.edu/socanth/ (http://www.ndsu.edu/socanth/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/community-development/ (http://catalog.ndsu.edu/programs-study/undergraduate/community-development/)

Minor Requirements

Minor: Community Development

Required Credits: 18

Minor Requirements

Code	Title	Credits
Required Courses		
SOC 405	Community Development	3
EMGT 410		3
Economic Electives: Select at least one course from the following:		**3**
AGEC 220		
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		
BUSN 487	Managerial Economics	
FIN 320	Principles of Finance	
FIN 410	Investment Analysis and Management	
FIN 430	Management of Financial Institutions	
MGMT 301		
MGMT 430	Leadership in Organizations	
MGMT 453	Understanding and Managing Diversity in Organizations	
MGMT 470	Entrepreneurship/Small Business Management	
MGMT 471	Leading Social Entrepreneurship and Nonprofit Organizations	
MRKT 301		
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		
EMGT 264		
EMGT 461		
GEOG 455	Introduction to Geographic Information Systems	
POLS 360	Principles of Public Administration	
SOC 431	Environmental Sociology	
SOC 439	Social Change	
SOC 465	Applied Demographics	
SOC/BUSN/ECON 196	Field Experience (or 296, 396, 496; no more than 3 credits)	
SOC/BUSN/ECON 199	Special Topics (or 299, 399, 499; no more than 3 credits)	
Select one additional course from the above categories		**3**
Total Credits		**18**

Minor Requirements and Notes

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

Comprehensive Science Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/comprehensive-science-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/comprehensive-science-education/)

The comprehensive science education degree requires coursework in biological sciences, chemistry, physics and earth science, as well as mathematics. Teaching science in middle and secondary school requires deep knowledge of (a) science content, (b) current theories of adolescent development, and (c) current best practices in middle and secondary instruction. Accordingly, the comprehensive science education major combines coursework in related sciences with professional education courses on teaching and learning.

The Program

Teacher candidates in comprehensive science education are prepared to teach students grades 5-12 with skill and confidence. The program is designed to develop science content knowledge as well as proficiency in a range of science-related skills and laboratory practices. Our professional education courses prepare teacher candidates to incorporate active learning strategies, create effective methods for assessment, and adjust

instruction to accommodate diverse learners. Teacher candidates also apply their knowledge and build their teaching skills during multiple clinical experiences in local schools.

Professional Education Courses

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

Student Teaching

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

Student Advisement

Comprehensive science education teacher candidates are assigned to academic advisors who work closely with them to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to meet with their advisor at least once every semester, as well as whenever needed.

licensure

Upon completing this program, teacher candidates are eligible for teacher licensure to teach all content areas of science in North Dakota. Teacher candidates interested in licensure to teach in other states should consult with their academic advisor because comprehensive science is not a typical teacher licensure category in all states. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPB).

Career Opportunities

Science teachers are in high demand across the country, so our graduates usually obtain full-time employment in school districts shortly after graduation.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	3	Primary Concentration[1]	4
Primary Concentration[1]	4	Secondary Concentration[1]	4
Secondary Concentration[1]	4	COMM 110	3
Gen Ed Quantitative Reasoning	3	ENGL 120	3
Gen Ed Wellness	2	Gen Ed Social & Behavioral Science & Cultural Diversity	3
	16		**17**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 321	3	EDUC 322	3
Primary Concentration[1]	4	Primary Concentration[1]	4
Secondary Concentration[1]	4	Secondary Concentration[1]	3
Secondary Concentration[1]	3	Gen Ed Humanits & Fine Arts	3
Gen Ed Humanities/FA & Global Perspectives	3	Gen Ed Social & Behavioral Science	3

Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
	17		**16**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 364	3	EDUC 481	3
EDUC 451	3	EDUC 486	3
Primary Concentration[1]	3	Primary Concentration[1]	3
Primary Concentration[1]	3	Secondary Concentration[1]	3
Secondary Concentration[1]	4	Tertiary Concentration[1]	4
	16		**16**
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 475	2	EDUC 485	1
EDUC 482	3	EDUC 487	9
EDUC 489	3	EDUC 488	3
ENGL 324	3		
Teritary Concentration[1]	4		
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
	15		**13**

Total Credits: 126

1

Refer to the official curriculum guide in the appropriate catalog year to select the classes that are identified in each of the concentration areas. The credits associated with this plan are approximate. The minimum credits for each concentration area will depend on the courses selected from the official curriculum guide.

Comprehensive Science Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/comprehensive-science-education/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/comprehensive-science-education/#planofstudytext)

Major Requirements

Major: Comprehensive Science Education

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.

4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

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Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Comprehensive Science Education Requirements		
ENGL 324	Writing in the Sciences	3
Teaching Specialty Requirements		
Primary Concentration - Select one primary concentration from biology, chemistry, earth science, physics. Concentrations listed below.		24-25
Secondary Concentration - Two secondary concentrations from the science area not selected for the primary concentration.		24-28
Teritary Concentration - One teritary concentration from the science area not selected for the primary or secondary areas.		8
Math Requirements		
Select the math requirement based on choice of primary concentration. See math requirement section below.		6-18
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I:	2-3
EDUC 482	Classroom Practice/Methods of Teaching II:	2-3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3

EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		**97-116**

Code	Title	Credits
Primary Concentration		
Select one primary concentration from biology, chemistry, earth science, or physics.		
Biology (24 credits)		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
BIOL 359	Evolution	3
BIOL 364	General Ecology	3
BIOL 370	Cell Biology	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
Chemistry (25 credits)		
Select one introductory chemistry sequence (A or B)		8
Sequence A:		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Sequence B:		
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	4
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory	5
BIOC 260	Elements of Biochemistry	4
Earth Science (25 credits)		
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
GEOL 350	Invertebrate Paleontology	3
GEOL 303	Paleontology Field Course	1
GEOL 412	Geomorphology	3
GEOL 420 & GEOL 421	Mineralogy and Mineralogy Laboratory	4
PHYS 110	Introductory Astronomy	3
SOIL 217	Introduction to Meteorology & Climatology	3
Physics (24 credits)		
PHYS 171	Introductory Projects in Physics	1
PHYS 215	Research For Undergraduates	1-3
PHYS 251 & 251L & 251R	University Physics I and University Physics I Laboratory and University Physics I Recitation	6

PHYS 252 & 252L & 252R	University Physics II and University Physics II Laboratory and University Physics II Recitation	6
PHYS 350	Modern Physics	3
PHYS 355		3
PHYS 361	Electromagnetic Theory	3

Code	Title	Credits
Secondary Concetration		
Select two secondary concentrations not selected as the primary.		
Biology (14 credits)		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 315	Genetics	3
BIOL 359	Evolution	3
Chemistry (12 credits)		
Select one introductory chemistry sequence (A or B)		8
Sequence A:		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Sequence B:		
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
Earth Science (14 credits)		
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
PHYS 110	Introductory Astronomy	3
SOIL 217	Introduction to Meteorology & Climatology	3
Physics (12 credits)		
PHYS 110 & 110L	Introductory Astronomy and Introductory Astronomy Lab	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4

Code	Title	Credits
Teritary Concentration		
Select one tertiary concentration not selected as the primary or secondary concentrations.		
Biology (8 credits)		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
Chemistry (8 credits)		

Select one introductory chemistry sequence (A or B)		8
Sequence A:		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Sequence B:		
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
Earth Science (8 credits)		
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
Physics (8 credits)		
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4

Code	Title	Credits
Math Requirements		
Select the math requirement based on the choice of primary concentration.		
Biology or Earth Science (6-7 credits)		
MATH 105	Trigonometry	3 or 4
or MATH 146	Applied Calculus I	
STAT 330	Introductory Statistics	3
Chemistry (11 credits)		
MATH 165	Calculus I	4
MATH 166	Calculus II	4
STAT 330	Introductory Statistics	3
Physics (18 credits)		
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 129	Basic Linear Algebra	3
or MATH 329	Intermediate Linear Algebra	

Degree Requirements and Notes

- See School of Education (https://www.ndsu.edu/education/) for admission requirements.
- Courses taken P/F may not be used to satisfy any requirements.
- A grade of 'C' or better is required in all professional education courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.
- Students who select Physics as their Primary Concentration can add Mathematics as an additional teacher licensure area with 6 additional credits. See your academic advisor for details.

Computer Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/ece/ (http://www.ndsu.edu/ece/)
- **Credential Offered:**
  B.S.Cpr.E.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/computer-engineering/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/computer-engineering/)

Computer engineering deals with both hardware and software aspects of computer systems. Students take both essential electrical and computer engineering classes along with core classes specific to computer engineering design. Demand for computer engineers is strong due to the growing use of computers in all aspects of products and the need for engineers competent in computing practices.

The Program

Computer engineering is a degree program in the College of Engineering and provides a background in three broad areas: computer hardware, software, and hardware-software integration. Fundamental topics included in the program are embedded systems, computer architecture, digital systems, embedded machine learning, algorithms and operating systems. In addition, the program includes core subjects that are common to all engineering disciplines and basic university studies in humanities and social sciences. The Bachelor of Science in Computer Engineering program is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the commission's General Criteria and Program Criteria for Electrical, Computer, Communications, Telecommunication(s) and Similarly Named Engineering Programs.

Areas of Specialization

The Computer Engineering program allows students to tailor their studies within broad parameters. Students are encouraged to develop an individual program of study in close consultation with their advisers. Examples are available to illustrate how specialization may be obtained in a number of different technical areas. Students may mix and match from the examples to suit their particular interests.

Technical areas include the following:

Computer Architecture/Digital VLSI – VLSI designers and computer architects design computer system hardware, including how the CPU communicates with various types of memory and high-performance multi-processor systems. VLSI design focusses on the lower levels of abstraction: transistor-level and physical-level design; whereas computer architecture focuses on the higher levels of abstraction: architecture and gate-level designs.

Cyber Physical Systems – deals with the interaction of computing elements monitoring/controlling physical entities, often in a large network.

Embedded Systems – deals with the design of a dedicated computer system to perform a specific task, often requiring real-time constraints. An example is a smartphone.

Computer Systems – deals with the close interaction between a system's hardware and software.

The Facilities

The Electrical and Computer Engineering building is part of an eight building engineering complex. The building contains specialized laboratories and equipment. Numerous grants and donations from the National Science Foundation and private industry have provided valuable equipment. Laboratories along with department and University computer capabilities support education and research. Students also have full access to computer clusters located in the ECE building and throughout the campus. These and other major computer resources are tied to local, regional, national and international computer networks, and remote access is provided for all ECE software.

Selective Admission

Transfer students from international institutions must have a 3.00 GPA.

Further, the department policy is that transfer courses equivalent to ECE 173 (or CSCI 160), ECE 275, EE 206 and all required math must have a C or better before enrolling in ECE courses listed in the curriculums for Junior & Senior years.

High School Preparation

High school students should attempt to complete one unit of physics, four units of mathematics and one unit of chemistry.

Career Opportunities

Graduates may find work as design engineers (computer hardware, software and systems), computer consultants, sales and customer support engineers or as engineers involved with computer-aided manufacturing and testing.

Research and Graduate Study

Graduate studies leading to a master's degree or doctoral degree are offered in the department. Further details are available in the *Graduate Bulletin*.

Cooperative Education Program

The Cooperative Education Program allows students to alternate classroom study with a series of paid professional work experiences related to electrical and computer engineering. These experiences increase in complexity as the student's background increases. The program provides opportunities for pre-graduation experience in the profession, exploration of several career opportunities, money for education, an enriched degree and enhanced opportunities for employment following graduation.

First Year			
Fall	**Credits**	**Spring**	**Credits**
MATH 098[1]	3	MATH 103[1]	3
ENGL 110	3	CHEM 121	3
COMM 110	3	ENGL 120	3
GEN ED Wellness	2	ECE 111	3
GEN ED Social/Behavioral Science and Global Perspective	3		
	14		**12**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
MATH 105[1]	3	MATH 165[1]	4
MATH 129[1]	3	CSCI 161	4
CSCI 160[1,4]	4	CSCI 222	3
GEN ED Humanities/Fine Arts and Cultural Diversity	3	ECE 275[1]	4
		GEN ED Science Lab (CHEM 121L or PHYS 251L)	1
	13		**16**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
MATH 166[1]	4	MATH 265[1]	4
EE 206[1]	4	PHYS 251	4
ECE 375	3	ECE 320	3
ENGR 327	3	ECE 311	4
GEN ED Upper Level English	3		
	17		**15**
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
MATH 266[1]	3	ECE 403	2
ECE 376	4	ECE 341	3
ECE 374	4	CpE Core[3]	3
ECE 343	4	CpE Core[3]	3
ECE 401	1	ECE Elective	3
ECE Elective	3		
	19		**14**
Fifth Year			
Fall	**Credits**		
ECE 405	3		
CpE Core[3]	3		
CpE Core[3]	3		

Tech Elective[2]	3
GEN ED Social/Behavioral Science	3
	15

Total Credits: 135

1

1. This course requires the student to earn a "C" or better, in order to take upper level ECE courses.

2

Choose from the approved Tech Elective List.

3

CpE Core Options:

1. **ECE 474 Computer Architecture** (prereq: ECE 374)
2. **ECE 477 Hardware design for Machine Learning** (prereqs: ECE 374 and ECE 375)
3. **ECE 423 VLSI Design** (prereqs: ECE 311 and ECE 321)
4. **ECE 425 Intro to Semiconductors** (prereqs: ECE 320)
5. **CSCI 474 Operating System Concepts** (prereqs: CSCI 374)
6. **CSCI 467 Algorithm Analysis** (prereqs: MATH 166, CSCI 161 and CSCI 222 or MATH 270)

4

ECE 173 is also an approved course for this requirement.

First Year				
Fall	**Credits**		**Spring**	**Credits**
MATH 103[1]		3	MATH 105[1]	3
CHEM 121		3	ECE 111	3
ENGL 110		3	ENGL 120	3
COMM 110		3	GEN ED Social/Behavioral Science and Global Perspective	3
GEN ED Wellness		2	GEN ED Science Lab (CHEM 121L or PHYS 251L)	1
		14		**13**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
MATH 165[1]		4	MATH 166[1]	4
MATH 129[1]		3	EE 206[1]	4
CSCI 160[1,4]		4	CSCI 161	4
ECE 275[1]		4	ECE 375	3
CSCI 222		3	GEN ED Humanities/Fine Arts and Cultural Diversity	3
		18		**18**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
MATH 265[1]		4	ECE 401	1
PHYS 251		4	MATH 266	3
ECE 311		4	ECE 320	3
Tech Elective[2]		3	ECE 343	4
GEN ED Upper Level English		3	GEN ED Social/Behavioral Science	3
		18		**14**

Fourth Year					
Fall	**Credits**		**Spring**	**Credits**	
ECE 403		2	ECE 405		3
ECE 376		4	ECE 341		3
ECE 374		4	CpE Core[3]		3
ENGR 327		3	CpE Core[3]		3
ECE Elective		3	CpE Core[3]		3
CpE Core[3]		3	ECE Elective		3
		19			**18**

Total Credits: 132

1

This course requires the student earn a "C" or better, in order to take upper level ECE courses.

2

Choose from the approved Technical Elective List.

3

CpE Core Options:

1. **ECE 474 Computer Architecture** (prereq: ECE 374)
2. **ECE 477 Hardware design for Machine Learning** (prereqs: ECE 374 and ECE 375)
3. **ECE 423 VLSI Design** (prereqs: ECE 311 and ECE 321)
4. **ECE 425 Intro to Semiconductors** (prereqs: ECE 320)
5. **CSCI 474 Operating System Concepts** (prereqs: CSCI 374)
6. **CSCI 467 Algorithm Analysis** (prereqs MATH 166, CSCI 161 and CSCI 222 or MATH 270)

4

ECE 173 is also an approved course for this requirement.

First Year					
Fall	**Credits**		**Spring**	**Credits**	
MATH 105[1]		3	MATH 165[1]		4
CSCI 160[1,4]		4	MATH 129[1]		3
CHEM 121		3	CSCI 161		4
COMM 110		3	ECE 111		3
ENGL 110		3	ENGL 120		3
		16			**17**
Second Year					
Fall	**Credits**		**Spring**	**Credits**	
MATH 166[1]		4	MATH 265[1]		4
EE 206[1]		4	PHYS 251		4
ECE 275[1]		4	CSCI 222		3
GEN ED Wellness		2	ECE 311		4
GEN ED Science Lab (CHEM 121L or PHYS 251L)		1	GEN ED Social/Behavioral Science and Global Perspective		3
		15			**18**
Third Year					
Fall	**Credits**		**Spring**	**Credits**	
MATH 266[1]		3	ECE 401		1
ECE 320		3	ECE 374		4
ECE 376		4	ECE 343		4

ECE 375	3	CpE Core[3]	3
GEN ED Humanities/Fine Arts and Cultural Diversity	3	Tech Elective[2]	3
	16		**15**

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
ECE 403	2	ECE 405	3
ECE 341	3	CpE Core[3]	3
ENGR 327	3	CpE Core[3]	3
CpE Core[3]	3	ECE Elective	3
ECE Elective	3	GEN ED Social/Behavioral Science	3
GEN ED Upper Level English	3		
	17		**15**

Total Credits: 129

1

This course requires a student to earn a "C" or better, in order to take upper level ECE courses.

2

Choose from the approved Tech Elective List.

3

CpE Core Options:

1. **ECE 474 Computer Architecture** (prereq: ECE 374)
2. **ECE 477 Hardware design for Machine Learning** (prereqs: ECE 374 and ECE 375)
3. **ECE 423 VLSI Design** (prereqs: ECE 311 and ECE 321)
4. **ECE 425 Intro to Semiconductors** (prereqs: ECE 320)
5. **CSCI 474 Operating System Concepts** (prereqs: CSCI 374)
6. **CSCI 467 Algorithm Analysis** (prereqs MATH 166, CSCI 161 and CSCI 222 or MATH 270)

4

ECE 173 is also an approved course for this requirement.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
MATH 165[1]	4	MATH 166[1]	4
ENGL 110	3	CHEM 121	3
CSCI 160[5]	4	ENGL 120	3
ECE 111	3	CSCI 161	4
GEN ED Humanities/Fine Arts	3	GEN ED Science Lab (CHEM 121L or PHYS 251L)	1
		GEN ED Wellness	2
	17		**17**

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
MATH 265[1]	4	MATH 266[1]	3

EE 206[1]		4	COMM 110		3
ECE 275[1]		4	ECE 375		3
MATH 129[1]		3	ECE 311		4
			PHYS 251		4
		15			**17**
Junior					
Fall	**Credits**		**Spring**	**Credits**	
ECE 341		3	ECE 343		4
ENGR 327 (Fulfills Gen Ed Humanities & Fine Arts (A)		3	ECE 376		4
ECE 374		4	ECE 401		1
ECE 320		3	CPE Core[4]		3
CSCI 222		3			
		16			**12**
Senior					
Fall	**Credits**		**Spring**	**Credits**	
ECE 403		2	ECE 405		3
ENGL/Upper Level Writing[2]		3	ECE Elective		3
ECE Elective		3	CPE Core[4]		3
Tech Elective[3]		3	CPE Core[4]		3
GEN ED Social/Behavioral Science and Global Perspectives		3	CPE Core[4]		4
			GEN ED Social/Behavioral Science and Cultural Diversity		3
		14			**19**

Total Credits: 127

1

This course requires the student to earn a "C" or better, in order to take upper level ECE courses.

2

Choose from ENGL 320, 321, 324 or 459

3

Choose from the approved Tech Elective list

4

CpE Core Options:

1. **ECE 474 Computer Architecture** (prereq: ECE 374)
2. **ECE 477 Hardware design for Machine Learning** (prereqs: ECE 374 and ECE 375)
3. **ECE 423 VLSI Design** (prereqs: ECE 311 and ECE 321)
4. **ECE 425 Intro to Semiconductors** (prereqs: ECE 320)
5. **CSCI 474 Operating System Concepts** (prereqs: CSCI 374)
6. **CSCI 467 Algorithm Analysis** (prereqs MATH 166, CSCI 161 and CSCI 222 or MATH 270)

5

ECE 173 is also an approved course for this requirement.

Computer Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/ece/ (http://www.ndsu.edu/ece/)

- **Credential Offered:**
  B.S.Cpr.E.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/computer-engineering/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/computer-engineering/#planofstudytext)

Major Requirements

Major: Computer Engineering

Degree Type: B.S.Cpr.E.
Minimum Degree Credits to Graduate: 126

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

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Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Computer Engineering Core Requirements		
ECE 111	Introduction to Electrical and Computer Engineering	3
ECE 173	Introduction to Computing	4
ECE 275	Digital Design	4
ECE 311	Circuit Analysis II	4

ECE 320	Electronics I	3
ECE 341	Random Processes	3
ECE 343	Signals & Systems	4
ECE 374	Computer Organization	4
ECE 375	Digital Design 2	3
ECE 376	Embedded Systems	4
ECE 401	Design I (capstone)	1
ECE 403	Design II (capstone)	2
ECE 405	Design III (capstone)	3
Math Courses Required		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III (w/ vectors)	4
MATH 266	Introduction to Differential Equations	3
CSCI Courses Required		
CSCI 161	Computer Science II (May satisfy general education category S for Computer Engineering majors only))	4
CSCI 222	Discrete Mathematics	3
Other Courses Required		
CHEM 121	General Chemistry I (May satisfy general education category S)	3
CHEM 121L	General Chemistry I Laboratory (May satisfy general education category S)	1
or PHYS 251L	University Physics I Laboratory	
EE 206	Circuit Analysis I	4
PHYS 251	University Physics I (May satisfy general education category S)	4
ENGR 327	Ethics, Engineering, and Technology	3
Select one from the following: (May satisfy general education category C)		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Core Electives		**12**
Select 4 courses from the following:		
ECE 423	VLSI Design	
ECE 425	Introduction to Semiconductor Devices	
ECE 474	Computer Architecture	
ECE 477	Hardware Design for Machine Learning	
CSCI 467	Algorithm Analysis	
CSCI 474	Operating Systems Concepts	
ECE Electives		**6**
Select 6 credits from the following. A Core Elective from the section above may be used in this section if not taken as an ECE Core Elective.		
ECE 321	Electronics II	
ECE 424	Analog VLSI	
ECE 444	Applied Digital Signal Processing	
ECE 448	Image Analysis I	
ECE 461	Control Systems I	
ECE 463	Modern Control	
ECE 470	Fault Tolerant Digital Systems	
ECE 472	Design Automation of VLSI Circuits	
ECE 476	Advanced Embedded Systems	
ECE 483	Instrumentation for Engineers	
ECE 485	Biomedical Engineering	
CSCI 459	Foundations of Computer Networks	

CSCI 413	Principles of Software Engineering	
Tech Electives		**3**
Select 3 credits from the following:		
CSCI 336	Theoretical Computer Science	
CSCI 366	Database Systems	
CSCI 372	Comparative Programming Languages	
CSCI 4XX	Any CSCI 400 level didactic course	
ECE 351	Applied Electromagnetics	
ECE 4XX	Any ECE 400 level didactic course	
ECE 494	Individual Study	
ECE 496	Field Experience (max. of 3 cr.)	
ENGR 310	Entrepreneurship for Engineers and Scientists	
IME 440	Engineering Economy	
IME 456	Program and Project Management	
IME 460	Evaluation of Engineering Data	
IME 470	Operations Research I	
PHYS 252	University Physics II	
Total Credits		**102**

Degree Requirements and Notes

- In order to graduate, an ECE student must have at least a 2.0 GPA in all required EE and ECE courses. Elective ECE courses are not included in this GPA requirement.
- All Students – Students are required to attain a grade of 'C' or better in ECE 173 Introduction to Computing, ECE 275 Digital Design, EE 206 Circuit Analysis I, and all required MATH courses.

Computer Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  B.S.; B.A.; Minor; UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/computer-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/computer-science/)

The Program

Computer Science can be earned as a B.A. or a B.S. degree, a minor and an undergraduate certificate. In addition, the department collaborates with two other departments to issue a dual major in Math and Computer Science, and Physics and Computer Science. An Accelerated Program is available for undergraduates with a 3.5 grade point average or better to complete a B.S. and a M.S. with a target graduation time of five years. In the Accelerated Program, graduate courses taken while an undergraduate student are used for both the B.S. and M.S. degree requirements. Currently, only the undergraduate certificate can be earned in an on-campus face-to-face format and in an online format.

We offer the most comprehensive and varied computer science programs in the region. In the core courses required of all majors, students are offered an opportunity to study concepts, applications and implementation techniques, which provide a broad and practical base both for a satisfying, well-paying career in computer science, and for advanced study. The curriculum offers an opportunity for an in-depth study of topics such as artificial intelligence, software engineering, cybersecurity, machine learning, data science, system simulation, computer communication networks, multimedia, operating systems, and database management systems. The department is expanding offerings in cybersecurity, data science, and software engineering. Students are encouraged to choose courses from related areas, such as business, economics, engineering, mathematics and statistics to broaden their program of study. Beginning in the junior year, students can explore co-op and internship opportunities to broaden their application of course-based knowledge. A senior capstone experience that provides a semester long project for industry is required and serves as an incredible opportunity to add maturity to the computer science skill set before graduation.

Career Opportunities

Computer scientists choose jobs in government, industry, teaching, research, agriculture, energy and other areas. A 2019 study showed that four of the eleven jobs with the most potential for growth are in areas taught by the Department. Graduates in computer science might choose a job in any of

these areas: artificial intelligence, systems analysis, software development/engineering, security, information assurance, cybersecurity, bioinformatics, data science, web development, networking, information system development, database management, technical support, automatic systems, robotics, and internet of things.

According to the Federal Bureau of Labor Statistics, software engineers, cybersecurity analysts, network systems and data scientists / analysts, computer scientists and database administrators are expected to be among the fastest growing occupations. Employment of these computer specialists is expected to increase much faster than average. Our programs provide excellent foundations for successful careers in these areas. As an undergraduate student, you will find many opportunities to work part-time as a research assistant on campus, or as a paid intern with a local or regional business.

Graduates of our department have accepted employment in major national businesses including Hewlett-Packard, IBM, AT&T, Apple, CISCO Systems, Google, Adesto, Cargill, SGI, FAST Enterprises, Medtronic, Microsoft, Bobcat, Facebook, Digi-Key, John Deere, Amazon, Intel, Raytheon, Target Corp. and Thomson Reuters. Many have chosen positions in North Dakota and adjoining states. There is a large and growing need for computer professionals in North Dakota.

During the final semester of their senior year, students take part in a capstone program. The objective of the capstone program is to provide the students with an experience that brings together the technical knowledge they have acquired while fostering valuable teamwork skills. This is accomplished by working in small teams on real-life projects. Capstone projects are done in conjunction with corporate, industrial or government clients/sponsors. Recent sponsors include Adventium, Aeritae Consulting, Appareo, ATC, BargInns, BCBSND, Border States Electric, Botlink, Bushel, Capturis, Collins Aerospace, Fjorge, IBM, Inwerken, John Deere, Marvin Windows, Microsoft, NAU Country, Noridian, OpenStack, Pedigree Technologies, Scheels, and UGPTI.

The Facilities

The department is located in the Quentin Burdick Building along with Information Technology Services. Students have free access to a wide range of computer systems.

CS Department equipment includes two clusters of Linux workstations, a number of virtual machines, and Hadoop and Spark analytic systems. Research labs support Windows, Macs, and Linux computers along with various peripheral equipment such as a cyber range, drones, and 3D printers. The department and the University have assumed a leadership role in computer networking through the acquisition and implementation of high-bandwidth network switches. The University also has entered into a six-state consortium for extremely high-level networking in the Upper Midwest. The high-performance Center for Computationally Assisted Science and Technology (CCAST) is available for distributed research projects. We are also a charter member of Internet2 and have connectivity to the national vBNS research network. The department maintains numerous web servers for class assignments and other information, which are accessed by thousands of users each day. The University provides more than 1,000 computers in 133 instrumented classrooms, 46 public computer labs, 21 department-owned labs and other spaces supported by Information Technology Services. There are 54 GoPrint release stations on campus for student printing. Internet usage is available for all students.

High School Preparation

While NDSU offers remedial courses for students who have not had the opportunity to complete all college-preparatory coursework, we recommend taking courses in high school that develop the ability to think logically, to organize, and to analyze (e.g., algebra, geometry, trigonometry, statistics and calculus). NDSU accepts the results of some AP tests in lieu of college classes through our Credit by Examination policy.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

B.S. Calculus Ready 4-Year Plan

Freshman					
Fall	**Credits**		**Spring**	**Credits**	
CSCI 160		4	CSCI 161		4
MATH 165		4	MATH 166		4
ENGL 110		3	ENGL 120		3
Gen. Ed Natural & Phys Science + Lab		4	Gen Ed Science/Tech		3
			Gen Ed HUM/FA and Cultural Diversity		3
		15			**17**

Sophomore					
Fall	**Credits**		**Spring**	**Credits**	
CSCI 213		3	CSCI 313		3
CSCI 222		3	CSCI 336		3
COMM 110		3	Gen Ed Soc/Beh Sci and Global Perspectives		3
CSCI 277 or MATH 129		3	Gen Ed Wellness		2
Gen Ed SOC/BehSci		3	Elective		3
		15			**14**
Junior					
Fall	**Credits**		**Spring**	**Credits**	
CSCI 372		3	CSCI 467		3
STAT 367		3	STAT 368		3
CSCI 366		3	CSCI 374		3
Gen Ed HUM/FA		3	Elective		3
CSCI Elective I		3	Gen Ed Upper Division Writing		3
		15			**15**
Senior					
Fall	**Credits**		**Spring**	**Credits**	
CSCI 489		3	CSCI 445		3
CSCI 474		3	CSCI Elective III		3
CSCI Elective II		3	Additional Electives		6
Gen Ed Science/Tech		3	CSCI 455		3
Additional Electives		3			
		15			**15**

Total Credits: 121

Sample Program Guide

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B.S. Preparatory Mathematics Course Required

Freshman							
Fall	**Credits**		**Spring**	**Credits**			
CSCI 122 or 159		3	CSCI 160		4		
ENGL 110		3	ENGL 120		3		
Gen. Ed Natural & Phys Science + Lab		4	Gen Ed Science/Tech		3		
Pre-Calculus course per placement		3	Pre-Calculus course		3		
		13			**13**		
Sophomore							
Fall	**Credits**		**Spring**	**Credits**		**Summer**	**Credits**
CSCI 161		4	COMM 110		3	CSCI 213	3
MATH 165		4	MATH 166		4		

CSCI 277 or MATH 129	3	Gen Ed Soc/Beh Sci and Glob Persp	3
Gen Ed Science/Tech	3	Gen Ed Hum/FineArt and Cult Div	3
Gen Ed Wellness	2	Elective	3
	16		**16**

Junior			
Fall	**Credits**	**Spring**	**Credits**
CSCI 222	3	CSCI 313	3
CSCI 366	3	CSCI 336	3
STAT 367	3	CSCI 374	3
CSCI 372	3	STAT 368	3
Gen Ed Hum/FineArt	3	Elective	3
	15		**15**

Senior			
Fall	**Credits**	**Spring**	**Credits**
CSCI Elective I	3	CSCI Elective III	3
CSCI Elective II	3	CSCI 445	3
CSCI 474	3	CSCI 467	3
CSCI 489	3	Electives	3
Gen Ed Upper Division Writing	3	Gen Ed Soc/Beh Sci	3
CSCI 455	3		
	18		**15**

Total Credits: 124

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

B.A. Plan of Study

First Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 159	3	ENGL 120	3
MATH 105	3	CSCI 160 (or CSCI 227 and CSCI 228)	4
CSCI 114 or TL 116	3	MATH 146	4
ENGL 110	3	First Year Language 102	4
First Year Language 101	4		
	16		**15**

Second Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 161	4	COMM 110	3
COMM 260	3	CSCI 222	3
Second Year Language 201	3	CSCI 371	3

Gen Ed Soc/Beh Sci	3	Second Year Language 202	3
		Free Elective	3
	13		**15**

Third Year

Fall	Credits	Spring	Credits
CSCI 213	3	CSCI 313	3
STAT 330	3	STAT 331	2
COMM 261	3	Gen Ed Science/Tech	3
Gen Ed Wellness	2	Gen Ed Upper Division Writing	3
Gen Ed Science and Tech/Lab	4	Gen Ed Soc/Beh Sci	3
	15		**14**

Fourth Year

Fall	Credits	Spring	Credits
CSCI 366	3	CSCI 445	3
CSCI 489	3	SCI, ENGR, MATH, STAT	3
CSCI 488	3	Electives	10
SCI, ENGR, MATH, STAT	4		
Elective	3		
	16		**16**

Total Credits: 120

Computer Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/computer-science/ (http://catalog.ndsu.edu/programs-study/undergraduate/computer-science/)

Major Requirements

Major: Computer Science

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

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Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

A Grade of 'C' or better is required for all CSCI prefix courses.

Code	Title	Credits
B.S. Computer Science Core Requirements		
CSCI 160	Computer Science I	4 or 6
or CSCI 227 & CSCI 228	Computing Fundamentals in Python I and Computing Fundamentals in Python II	
CSCI 161	Computer Science II	4
CSCI 213	Modern Software Development	3
CSCI 222	Discrete Mathematics	3
CSCI 313	Software Development with Frameworks	3
CSCI 336	Theoretical Computer Science	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3
CSCI 374	Computer Organization and Architecture	3
CSCI 445	Software Projects Capstone [1]	3
CSCI 455	Networking and Parallel Computation	3
CSCI 467	Algorithm Analysis	3
CSCI 474	Operating Systems Concepts	3
CSCI 489	Social Implications of Computers [1]	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
STAT 367	Probability	3
STAT 368	Statistics	3 or 5
or STAT 330 & STAT 331	Introductory Statistics and Regression Analysis	
Track: Select one track from the four listed below		**12**
Total Credits		**70-74**

STANDARD TRACK

Code	Title	Credits
Select one of the following:		3
MATH 129	Basic Linear Algebra	
CSCI 277	Introduction to UNIX	
Computer Science Electives:		9
Select 3 didactic courses from any 300-400 level CSCI prefix courses that are not part of the core requirement.		
Total Credits		**12**

CYBERSECURITY TRACK

Code	Title	Credits
CSCI 277	Introduction to UNIX	3
Cybersecurity Electives:		9
CSCI 403	Defensive Network Security	
CSCI 404	Ethical Hacking	
CSCI 405	Principles of Cybersecurity	
CSCI 408	Malware Detection, Analysis and Threat Mechanisms	
CSCI 409	Cybersecurity Law and Policy	
CSCI 410	Computer Crime and Forensics	
CSCI 411	Secure Software Development	
CSCI 469	Network Security	
CSCI 473	Foundations of the Digital Enterprise	
Total Credits		**12**

DATA SCIENCE TRACK

Code	Title	Credits
MATH 129	Basic Linear Algebra	3
Data Science Electives:		9
CSCI 411	Secure Software Development	
CSCI 420	Introduction to Data Science in Python	
CSCI 422	Fundamentals of Data Engineering	
CSCI 425	Machine Learning	
CSCI 426	Introduction to Artificial Intelligence	
CSCI 428	Artificial Intelligence, Ethics, and the Environment	
CSCI 436	Intelligent Agents	
CSCI 450	Cloud Computing	
CSCI 479	Introduction to Data Mining	
Total Credits		**12**

SOFTWARE ENGINEERING TRACK

Code	Title	Credits
Select one of the following:		3
MATH 129	Basic Linear Algebra	
CSCI 277	Introduction to UNIX	
Software Engineering Electives:		9
CSCI 411	Secure Software Development	
CSCI 412	Mobile Software Engineering	
CSCI 413	Principles of Software Engineering	
CSCI 416	Software Architecture and Design	
CSCI 419	Software Testing and Debugging	
CSCI 422	Fundamentals of Data Engineering	
CSCI 450	Cloud Computing	

CSCI 473	Foundations of the Digital Enterprise	
CSCI 488	Human-Computer Interaction	
Total Credits		**12**

[1]

Department Capstone: CSCI 445 Software Projects Capstone (typically taken during the last spring semester prior to degree completion) & CSCI 489 Social Implications of Computers (typically taken during the last fall semester prior to degree completion)

Major Requirements

Major: Computer Science

Degree Type: B.A.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
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ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Category R: Quantitative Reasoning [†]		**3**
Category S: Science and Technology [†]		**10**
Category A: Humanities and Fine Arts [†]		**6**
Category B: Social and Behavioral Sciences [†]		**6**
Category W: Wellness [†]		**2**
Category D: Cultural Diversity [*†]		
Category G: Global Perspectives [*†]		
Total Credits		**39**

[*]

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

[†]

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

Major Requirements

A Grade of 'C' or better is required for all CSCI prefix courses.

Code	Title	Credits
B.A. Computer Science Core Requirements		
CSCI 114	Computer Applications (May satisfy general education category S)	3

or TL 116	Business Software Applications	
CSCI 159	Computer Science Problem Solving	3
CSCI 160	Computer Science I	4 or 6
or CSCI 227 & CSCI 228	Computing Fundamentals in Python I and Computing Fundamentals in Python II	
CSCI 161	Computer Science II	4
CSCI 213	Modern Software Development	3
CSCI 222	Discrete Mathematics	3
CSCI 312	Survey of Programming Languages	3
CSCI 313	Software Development with Frameworks	3
CSCI 366	Database Systems	3
CSCI 371	Web Scripting Languages	3
CSCI 445	Software Projects Capstone [1]	3
CSCI 488	Human-Computer Interaction	3
CSCI 489	Social Implications of Computers [1]	3
Related Major Requirements		
COMM 260	Introduction to Web Design	3
COMM 261	Introduction to Web Development (or any 300/400 level CSCI elective)	3
MATH 146	Applied Calculus I (May satisfy general education category R)	4
or MATH 165	Calculus I	
STAT 330	Introductory Statistics	3
STAT 331	Regression Analysis	2
Other Courses:		
Select these seven credits from the following areas:		7
Science	Cannot be courses with the CSCI prefix	
Engineering	Cannot be ENGR 311 or ENGR 312	
Math	MATH prefix course with a number higher than MATH 147, but not MATH 165	
Statistics	STAT prefix course (except for STAT 330 or STAT 331)	
BA Degree Requirements		
Proficiency at the second year level in a modern foreign language.		
Total Credits		**63-65**

1

CSCI 445 Software Projects Capstone & CSCI 489 Social Implications of Computers form the department capstone. CSCI 445 is typically taken during the last spring semester and CSCI 489 is typically taken during the last fall semester prior to degree completion.

Minor Requirements

Minor: Computer Science

Minimum Credits: 16

Minor Requirements

Code	Title	Credits
Required Courses		
CSCI 213	Modern Software Development	3
Choose one of the following sequences:		8-9
CSCI 160 & CSCI 161	Computer Science I and Computer Science II	
CSCI 227 & CSCI 228 & CSCI 229	Computing Fundamentals in Python I and Computing Fundamentals in Python II and Computing Fundamentals in Python III	
Additional Electives: Select 5 or 6 credits to reach the minor 16 cr. minimum (at least 3 credits must be CSCI 300-400 level).		5-6
Total Credits		**16-18**

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 this minor.

Certificate Requirements

Computer Science

Minimum Credits: 11

Code	Title	Credits
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 277	Introduction to UNIX	3
Total Credits		**11**

Computer Science and Mathematics

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/computer-science-mathematics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/computer-science-mathematics/)

This dual major takes advantage of close connections between Computer Science (https://www.ndsu.edu/cs/) and Mathematics (https://www.ndsu.edu/math/), representing a streamlined curriculum that covers important concepts of both majors while removing redundancies between the programs. Students earn one degree with this dual major.

It is of particular interest to Computer Science students who wish to expand their understanding of mathematical foundations beyond the concepts that are covered in a B.S. in Computer Science with a Mathematics minor. Students are encouraged to enroll in this program if they intend to pursue a graduate degree in one of the more theoretical areas of computer science, or just generally have an interest in expanding their mathematics education.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 160	4	CSCI 161	4
MATH 129	3	MATH 166	4
MATH 165	4	COMM 110	3
ENGL 110 (or placement)	3	Gen Ed Science/Tech and Lab	4
ENGL 120	3		
	17		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 213	3	CSCI 313	3
MATH 265	4	MATH 266	3
MATH 270	3	MATH 329	3

STAT 367	3	STAT 368	3
Gen Ed Science/Tech	3	Gen Ed Science/Tech	3
	16		**15**

Third Year

Fall	Credits	Spring	Credits
CSCI 366	3	CSCI 336	3
CSCI 372	3	CSCI 467	3
CSCI 374	3	MATH 300-400 level	3
MATH 420	3	Gen Ed Upper Division Writing	3
Gen Ed Humanities/Fine Art and Cult Diversity	3	Gen Ed Social/Behavioral Sci and Glob Perspective	3
	15		**15**

Fourth Year

Fall	Credits	Spring	Credits
CSCI 489	3	CSCI 445	3
MATH 491	1-5	300-400 level CSCI course (CSCI 455 or CSCI 474 recommended)	3
MATH 300-400 level	3	Gen Ed Social/Behavioral Science	3
Gen Ed Humanities/Fine Art	3	Gen Ed Wellness	2
Elective	3	Elective	3
	14		**14**

Total Credits: 121

Computer Science and Mathematics

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/computer-science-mathematics/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/computer-science-mathematics/#planofstudytext)

Major Requirements

Major: Computer Science & Mathematics

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

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Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

A grade of 'C' or better is required in MATH & CSCI prefix courses used toward the major.

Code	Title	Credits
Mathematics Major Requirements		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 420	Abstract Algebra I	3
MATH 491	Seminar	2
Choose 6 credits of 300-400 level Math courses (we recommend two of the following):		6
MATH 421	Abstract Algebra II	
MATH 430	Graph Theory	
MATH 436	Combinatorics	
MATH 488	Numerical Analysis	
Computer Science Major Requirements		
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 213	Modern Software Development	3
CSCI 313	Software Development with Frameworks	3
CSCI 336	Theoretical Computer Science	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3
CSCI 374	Computer Organization and Architecture	3

CSCI 445	Software Projects Capstone	3
CSCI 467	Algorithm Analysis	3
CSCI 489	Social Implications of Computers	3
Choose 3 credits of 300-400 level CSci courses (we recommend one of the following):		3
CSCI 455	Networking and Parallel Computation	
CSCI 474	Operating Systems Concepts	
or any course numbered 420-429		
Related Required Courses		
STAT 367	Probability	3
STAT 368	Statistics	3
Total Credits		**79**

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Computer Science and Physics

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/computer-science-physics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/computer-science-physics/)

Since the dawn of the computer age, Computer Science and Physics have been closely intertwined disciplines. Computational physics is now an established branch of physics, complementing experiment and theory, that develops and applies computer modeling approaches to the solution of a wide range of physical problems. At the same time, software development (e.g., for graphics and data mining applications) is increasingly inspired by physics. Computer modeling, including simulation and numerical analysis, is an essential component of modern research and development. Correspondingly, the demand is growing for scientists with multidisciplinary training that combines fundamental knowledge of physics and computer science with practical skills in programming and computation.

The Computer Science and Physics dual major program is designed to allow students to complete one degree and the core requirements of both majors. Graduates of the program will have a unique background qualifying them to work in industry or to pursue graduate studies in physics, computer science, engineering, or other technical fields.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
PHYS 171	1	ENGL 120	3
MATH 165	4	PHYS 251 & 251L	5
CSCI 160	4	MATH 129 or 329	3
ENGL 110	3	MATH 166	4
Wellness Gen Ed	2	CSCI 161	4
	14		**19**

Sophomore				
Fall	**Credits**		**Spring**	**Credits**
PHYS 252 & 252L		5	PHYS 350	3
MATH 265		4	MATH 266	3
CSCI 213		3	COMM 110	3
MATH 270		3	CSCI 336	3
			Humanities/Fine Arts Gen Ed	3
		15		**15**
Junior				
Fall	**Credits**		**Spring**	**Credits**
PHYS 360		3	PHYS 370	3
CSCI 366		3	ENGL 324	3
PHYS 355		3	PHYS 361	3
Social/Behavioral Sci and Cult Diversity Gen Ed		3	CSCI 372	3
Humanities/Fine Arts & Global Perspectives Gen Ed		3	CSCI 374	3
		15		**15**
Senior				
Fall	**Credits**		**Spring**	**Credits**
PHYS 462		3	PHYS 489	2
Physics Elective		3	CSCI 467	3
CSCI 474		3	PHYS 486	3
CSCI 4XX Computer Science Elective		3	CSCI 313	3
PHYS 485		3	or CSCI 4XX Computer Science Elective	
PHYS 488		1	Humanities/Fine Arts Gen Ed	3
			Social/Behavioral Science Gen Ed	3
		16		**17**

Total Credits: 126

Computer Science and Physics

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/computer-science-physics/ (http://catalog.ndsu.edu/programs-study/undergraduate/computer-science-physics/)

Major Requirements

Major: Computer Science & Physics

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

A grade of 'C' or better is required for all CSCI, PHYS, and AST prefix courses.

Code	Title	Credits
Computer Science Major Requirements		
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 189	Skills for Academic Success [1]	1
CSCI 213	Modern Software Development	3
CSCI 336	Theoretical Computer Science	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3
CSCI 374	Computer Organization and Architecture	3
CSCI 467	Algorithm Analysis	3
CSCI 474	Operating Systems Concepts	3
CSCI Electives	CSCI 313 and/or any 400-level CSCI course that is not already used.	6
Physics Major Requirements:		
PHYS 171	Introductory Projects in Physics	1

PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
PHYS 350	Modern Physics	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHY 370: Electromagnetic Theory at MSUM)	3
PHYS 370	Introduction to Computational Physics	3
PHYS 355	(or PHY 330: Internediate Mechanics at MSUM)	3
PHYS 462	Thermal and Statistical Physics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
Physics Electives: Select from the following:		6
PHYS 215	Research For Undergraduates	
PHYS 411	Optics for Scientists & Engineers	
PHYS 413	Lasers for Scientists and Engineers	
PHYS 415	Elements of Photonics	
PHYS 481	Materials Physics	
PHYS 488	Senior Project I (If not used to satisfy project requirement)	
PHYS 489	Senior Project II (If not used to satisfy project requirement)	
MSUM AST	Astronomy courses (300/400-level) with departmental permission.	
Related Required Courses		
MATH 129	Basic Linear Algebra	3
or MATH 329	Intermediate Linear Algebra	
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
CSCI 445	Software Projects Capstone	3
or PHYS 488 & PHYS 489	Senior Project I and Senior Project II	
Total Credits		**101**

1

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

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Computer Science Foundations

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/computer-science-foundations/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/computer-science-foundations/)

The Computer Science Foundations certificate completes the list of courses recommended for the first 2-3 semesters in the Computer Science B.S. major. Prerequisites for this certificate can be met in one of two ways: Students who have completed the Fundamentals of Computing and Security

certificate can proceed with the remaining course in the Python sequence (CSCI 228). Students without programming background can take the Computer Science I course in Java (CSCI 160), provided they pass the math placement test at trigonometry or pre-calculus level. This certificate provides fluency in data structures and algorithms (CSCI 161) and the use of the Unix operating system (CSCI 277), which is important in all of our majors.

Computer Science Foundations

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/computer-science-foundations// (http://catalog.ndsu.edu/programs-study/undergraduate/computer-science-foundations//)

Certificate Requirements

Computer Science Foundations

Required Credits: 11

Required Courses

Code	Title	Credits
CSCI 160	Computer Science I	3 or 4
or CSCI 228	Computing Fundamentals in Python II	
CSCI 161	Computer Science II	4
CSCI 277	Introduction to UNIX	3
Total Credits		**10-11**

Computing Systems

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/computing-systems/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/computing-systems/)

The Computing Systems certificate provides thorough coverage of more advanced concepts in languages and systems. Students with a baccalaureate degree in a non-STEM discipline who wish to do graduate studies in Computer Science would be able to demonstrate advanced quantitative skills through this certificate. Programming knowledge equivalent to the Computer Science Foundations certificate is expected.

Computing Systems

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/computing-systems/ (http://catalog.ndsu.edu/programs-study/undergraduate/computing-systems/)

Certificate Requirements

Computing Systems

Required Credits: 9

Required Courses

Code	Title	Credits
CSCI 336	Theoretical Computer Science	3
or CSCI 359	Networking	
CSCI 374	Computer Organization and Architecture	3
CSCI 474	Operating Systems Concepts	3
Total Credits		**9**

Construction Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/ccee/ (http://www.ndsu.edu/ccee/)
- **Credential Offered:**
  B.S.Cons.E.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/construction-engineering/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/construction-engineering/)

The construction industry is one of the largest industries in the United States. It accounts for nearly 8 percent of the nation's gross national product and employs millions of people. The industry is divided into four sectors: residential building construction, industrial construction, commercial building construction, and heavy civil construction. The Construction Engineering program prepares nationally competitive students for successful careers in the construction industry.

THE PROGRAM

Construction Engineering involves the planning, design, and management of construction facilities, such as highways, bridges, airports, railroads, buildings, dams, and reservoirs. The construction of such projects requires 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 Bachelor of Science in Construction Engineering degree offers a blend of engineering and construction courses. The program is designed for those who want to work in the construction industry and become prepared for licensure as a professional engineer. A thorough knowledge of the physical sciences, math, and engineering is developed during the first two years followed by construction management and engineering courses. The technical side of the program is balanced with requirements in writing, humanities, social science, and communications. The Bachelor of Science in Construction Engineering program is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the commission's General Criteria and Program Criteria for Construction and Similarly Named Engineering Programs.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

Graduates from the Bachelor of Science in Construction Engineering program are expected within the first few years after graduation to:

1. Engage successfully in the practice of construction engineering to solve current and emerging problems.
2. Integrate ethical considerations, diverse perspectives, and an awareness of the broader societal and sustainability implications into design and decision-making processes.
3. Begin to serve in mid-level project leadership roles in their construction engineering career.
4. Advance their profession through collaborative work, obtaining professional licensure, pursuing advanced degrees, and continuously acquiring new knowledge, while providing service to the community.

STUDENT OUTCOMES (SO)

The Program Educational Objectives are further connected to seven Student Outcomes (SO), developed by the Engineering Accreditation Commission of ABET, which describe what students are expected to know and be able to do by the time of graduation. These outcomes relate to the skills, knowledge, and behaviors that students acquire in their matriculation through the program. The Student Outcomes are listed below:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

CURRICULUM

First-year construction engineering students at NDSU begin their education with fundamental courses in English, chemistry, mathematics, and an introduction to the engineering and construction sciences. Second-year courses become more specific with an emphasis on surveying, mathematics, physics, and engineering and construction science courses. Third-year courses reflect the key areas of construction engineering and management. The senior year continues with key construction courses but also provides 12 hours of technical electives and a senior design project as well as a business law course.

Accelerated PROGRAM

Option 1: The accelerated program provides opportunities for current students in the Construction Engineering program to pursue the Master of Construction Management (MCM) offered by the department, which requires at least a total of 30 course credits. Up to 9 credits (three courses) from the Master of Construction Management program can be used to complete requirements in the undergraduate construction engineering program. These courses must be taken at the 600- or 700-level.

Option 2: Students in the Construction Engineering program have the option to obtain a Master's degree through the accelerated BSCE or BSConE + MSCE program, which requires at least a total of 24 course credits and 6 master's thesis credits. Up to 9 credits (three courses) from the Master of Science in Civil Engineering program can be used to complete requirements in the undergraduate construction engineering program. These courses must be taken at the 600- or 700-level.

Applicants can apply for admission in their junior year (having accumulated more than 75 credits) with an average accumulative GPA above 3.5. The review procedure for applications will follow the existing policy of master's graduate student admissions.

FACULTY

The Department has well-qualified and dedicated faculty. They are nationally and internationally recognized experts, with the knowledge and experience to prepare graduates for successful careers. All faculty members in the department have a doctoral degree. Many are licensed as a Professional Engineer (PE) or Certified Professional Constructor (CPC). In addition, the department has many adjunct faculty members who worked or are currently working in the industry.

FACILITIES

The department has excellent laboratory facilities for undergraduate education across all civil, environmental, and construction areas, including the teaching laboratories for civil engineering materials, construction management and engineering, environmental engineering, geotechnical engineering, structural engineering, transportation engineering, and water resources engineering. Students also have access to computer clusters and many state-of-the-art research laboratories. The program has the most updated modern teaching and research equipment such as GPS units, robotic total stations, drones, and VR units.

STUDENT ORGANIZATIONS

Students participate in many professional departmental student organizations in the department, which helps them develop leadership and teamwork skills. The major student organizations include the American Railway Engineering and Maintenance-of-Way Association (AREMA), American Society of Civil Engineers (ASCE), American Water Works Association (AWWA), Associated General Contractors (AGC), Institute of Transportation Engineers (ITE), Materials Research Society (MRS), National Association of Homebuilders (NAHB), Sigma Lambda Chi, and Water Environment Federation (WEF), as well as Steel Bridge, Concrete Canoe, Associated Schools of Construction, and Residential Construction Management, GeoWall, and Quiz Bowl competition teams. Students may also participate in several student organizations within the College of Engineering, including the American Indian Science and Engineering Society (AISES), Engineers Without Borders (EWB), Grand Challenge Scholars of NDSU, Habitat for Humanity, National Society of Black Engineers (NSBE), and Society of Women Engineers (SWE). The student organizations have won several national and regional awards.

PREPARATION

High school students who wish to prepare for some phase of engineering at the college level should attempt to complete the following high school credits: one unit of physics, four units of mathematics, and one unit of chemistry. Incoming freshmen prepared to enroll in calculus frequently complete their construction engineering degree in four years. Students who have studied two years of pre-engineering at another institution typically complete the construction engineering degree in two additional years.

SCHOLARSHIP AND FINANCIAL AID

The department awards numerous scholarships each year, which mostly range from $500 to $10,000. The AGC of North Dakota and the Fargo/Moorhead Home Builders Care Foundation (a charitable arm of the Home Builders Association of Fargo-Moorhead) offer annual scholarships to incoming first-year and outstanding other students. In addition, many other scholarships, such as the Cossette Construction Management and Engineering Scholarship, Excellence in Construction Safety Scholarship, and Interstates Construction Management and Engineering Scholarship, are available to students. Students should check with the department for more information. Other forms of financial aid are available through the Office of Financial Aid and Scholarships.

CAREER OPPORTUNITIES

Construction engineering graduates are in high demand after graduation by contractors in all types of construction, from design-construction firms to large owners who have continuing construction projects. Positions available include field engineer, office engineer, project engineer, project controls engineer, superintendent, and project manager. The starting salary for fresh graduates has been between $65,000 and $85,000 in recent years. Students from construction engineering find summer internships or employment in the construction industry. The U.S. Bureau of Labor Statistics projects a 5-percent growth in employment for construct engineers from 2022 to 2032 which is above the average growth rate for all occupations (3 percent).

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
CM&E 111	1	CM&E 212	3
CM&E 200	3	MATH 166	4
MATH 165	4	ENGL 120	3
ENGL 110	3	CHEM 122	3
CHEM 121	3	ME 221	3
CHEM 121L	1	ECON 105, 201, or 202	3
	15		**19**
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
CM&E 204	3	CM&E 240	3
MATH 128	1	PHYS 252	4
MATH 259	3	COMM 110	3
ME 222	3	MATH 266	3
GEOL 105 or 106	3	ME 223	3
Social & Behavioral Sciences	3	Wellness	2
	16		**18**
Junior			
Fall	**Credits**	**Spring**	**Credits**
CM&E 305	3	CM&E 301	3
CM&E 380	3	CM&E 315 or 715[2]	3
CE 309	3	CE 303	2

CE 316	3	CE 303L	1
STAT 330	3	CE 343	4
		CM&E 405 or 605[2]	3
	15		**16**

Senior

Fall	Credits	Spring	Credits
CM&E 403 or 603[2]	3	CM&E 489	3
ENGL 320 or 321	3	ENGR 327	3
4XX Technical Elective[1]	3	BUSN 431	3
4XX Technical Elective[1]	3	4XX Technical Elective[1]	3
Humanities & Fine Arts Gen Ed	3	4XX Technical Elective[1]	3
	15		**15**

Total Credits: 129

1

Refer to the official curriculum (https://catalog.ndsu.edu/undergraduate/program-curriculum/construction-engineering/) for the CE 400 level course options (minimum 12 credits)

2

Accelerated program will allow students to take up to 9 credits of graduate-level courses that can be used to fulfill both the undergraduate-level and graduate-level curriculum requirements. A separate application for the accelerated program applies.

Construction Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/ccee/ (http://www.ndsu.edu/ccee/)
- **Credential Offered:**
  B.S.Cons.E.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/construction-engineering/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/construction-engineering/#planofstudytext)

Major Requirements

Major: Construction Engineering

Degree Type: B.S.Cons.E.
Minimum Degree Credits to Graduate: 129

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

major requirements

Code	Title	Credits
Construction Engineering Core Requirements		
CM&E 111	Introduction to Construction Management and Engineering	1
CM&E 200	Construction Documents and Codes	3
CM&E 204	Construction Surveying	3
CM&E 212	Construction Graphic Communications	3
CM&E 240	Financial Cost Concepts for Construction Managers	3
CM&E 301	Construction Technology and Equipment	3
CM&E 305	Pre-Construction Management	3
CM&E 315	Specifications and Contracts	3
CM&E 380	Construction Estimating: Quantities and Costs	3
CM&E 403	Scheduling and Project Control	3
CM&E 405	Construction Support Operations	3
CM&E 489	Construction Design Capstone	3
CE 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 431	Sustainable Design and Construction	
CM&E 465	Bridge Engineering and Management	
or CE 425	Bridge Evaluation and Rehabilitation	
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 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
BUSN 431	Business Law I-Contracts, Property and Torts	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122	General Chemistry II	3
ENGL 320	Business and Professional Writing	3
or ENGL 321	Writing in the Technical Professions	
ENGR 327	Ethics, Engineering, and Technology	3
GEOL 105	Physical Geology	3
or GEOL 106	The Earth Through Time	
PHYS 252	University Physics II	4
STAT 330	Introductory Statistics	3
Select one from the following:		3
ECON 105	Elements of Economics	
or ECON 201	Principles of Microeconomics	
or ECON 202	Principles of Macroeconomics	
Total Credits		**112**

Degree Requirements and Notes

- A minimum 2.50 cumulative GPA is required for transfer students to be admitted to the B.S. in construction engineering program.

Construction Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/ccee/ (http://www.ndsu.edu/ccee/)
- **Credential Offered:**
  B.S.Cons.M.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/construction-management/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/construction-management/)

The construction industry is one of the largest industries in the United States. It accounts for nearly 8 percent of the nation's gross national product and employs millions of people. The industry is divided into four sectors including residential building construction, industrial construction, commercial building construction, and heavy civil construction. The Construction Management program prepares nationally competitive students for successful careers in the construction industry.

THE PROGRAM

Construction Management is a combination of technology, construction techniques, and management to meet the needs of the rapidly growing construction industry. Construction management studies less math and engineering concepts than construction engineering but focuses more on business-related courses. The program is designed to prepare students for the art of achieving maximum profit by efficient use of people, machines, materials, and other resources to complete a construction project on time and to the satisfaction of the owner. A meld of engineering, construction, management, and business gives the student a background and understanding of a management point of view in the construction industry. The

program leading to a Bachelor of Science (BS) in Construction Management degree is accredited by the American Council for Construction Education (https://www.acce-hq.org/) (ACCE).

A minor in Business Administration offered by the College of Business is required for all B.S. in Construction Management students. Students are required to have a minimum cumulative GPA of 2.50 to be admitted into the minor program. A minor in Business Administration requires a minimum GPA of 2.50 in the courses that satisfy the minor. In addition, a cumulative GPA of 2.50 overall is required to graduate with a Bachelor of Science in Construction Management degree.

PROGRAM MIssion Statement

The Construction Management undergraduate program prepares nationally competitive graduates for successful careers in the construction management profession.

PROGRAM OBJECTIVES

1. Provide a comprehensive curriculum to meet the construction industry's needs.
2. Produce graduates with communication skills to successfully practice in the construction profession.
3. Promote professional opportunities such as guest speakers, scholarships, and internships from the construction industry to students.

The Program Objectives support the department and program missions and are further connected to the Program Learning Outcomes.

Program LEARNING OUTCOMES

The Construction Management program has adopted the 17 Student Learning Outcomes (SLOs) defined by ACCE as the Program Learning Outcomes (PLOs). Upon graduation from the Construction Management program, graduates shall be able to:

1. Create written communications appropriate to the construction discipline.
2. Create oral presentations appropriate to the construction discipline.
3. Create a construction project safety plan.
4. Create construction project cost estimates.
5. Create construction project schedules.
6. Analyze professional decisions based on ethical principles.
7. Analyze methods, materials, and equipment used to construct projects.
8. Apply electronic-based technology to manage the construction process.
9. Apply basic surveying techniques for construction layout and control.
10. Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.
11. Understand construction accounting and cost control.
12. Understand construction quality assurance and control.
13. Understand construction project control processes.
14. Understand the legal implications of contract, common, and regulatory law to manage a construction project.
15. Understand the basic principles of sustainable construction.
16. Understand the basic principles of structural behavior.
17. Understand the basic principles of HVAC, electrical and plumbing systems.

CURRICULUM

First-year construction management students at NDSU begin their education with fundamental courses in English, chemistry, mathematics, and an introduction to the construction and economics basics. Second-year courses become more specific with an emphasis on surveying, physics, and construction science and methods courses. Third-year courses reflect the key areas of construction management along with business fundamentals. The senior year continues with key construction management courses and also provides 9 hours of business electives and a senior capstone project.

Accelerated PROGRAM

The BSCM + MCM accelerated program provides opportunities for current students in the Construction Management program to pursue the Master of Construction Management (MCM) offered by the department. Students in the Construction Management program have an option to obtain a Master's degree through the accelerated BSCM + MCM program, which requires at least a total of 30 course credits. Up to 9 credits (three courses) from the Master of Construction Management program can be used in the undergraduate program. These courses must be taken in the 600- or 700-level. In that sense, the interested students could accelerate the master's study by shortening three courses, so that they could complete the remaining 21 credits and graduate in one year.

FACULTY
The department has well-qualified and dedicated faculty members. They are nationally and internationally recognized experts, with the knowledge and experience to prepare graduates for successful careers. Most faculty members in the department have a doctoral degree. Many of them are licensed

as a Professional Engineer (PE) or Certified Professional Contractor (CPC). In addition, the department has many adjunct faculty members who worked or are currently working in the industry.

FACILITIES

The department has excellent laboratory facilities for undergraduate education across all civil, environmental, and construction areas, including the teaching laboratories for civil engineering materials, construction management and engineering, environmental engineering, geotechnical engineering, structural engineering, transportation engineering, and water resources engineering. Students also have access to computer clusters and many state-of-the-art research laboratories. The program has the most updated modern teaching and research equipment such as GPS units, robotic total stations, drones, and VR units.

STUDENT ORGANIZATIONS

Students participate in many professional departmental student organizations in the department, which helps them develop leadership and teamwork skills. The major student organizations include the American Railway Engineering and Maintenance-of-Way Association (AREMA), American Society of Civil Engineers (ASCE), American Water Works Association (AWWA), Associated General Contractors (AGC), Institute of Transportation Engineers (ITE), Materials Research Society (MRS), National Association of Homebuilders (NAHB), Sigma Lambda Chi, and Water Environment Federation (WEF), as well as Steel Bridge, Concrete Canoe, Associated Schools of Construction and Residential Construction Management, GeoWall, and Quiz Bowl competition teams. Students may also participate in several student organizations within the College of Engineering, including the American Indian Science and Engineering Society (AISES), Engineers Without Borders (EWB), Grand Challenge Scholars of NDSU, Habitat for Humanity, National Society of Black Engineers (NSBE), and Society of Women Engineers (SWE). The student organizations have won several national and regional awards.

PREPARATION

High school students who wish to prepare for some courses at the college level should attempt to complete the four units of high school mathematics. Incoming freshmen prepared to enroll in calculus frequently complete their construction management degree in four years. Transfer students who have studied two years of construction-related courses at another institution typically complete the construction management degree in two additional years.

SCHOLARSHIP AND FINANCIAL AID

The department awards numerous scholarships each year, which mostly range from $500 to $10,000. The AGC of North Dakota and the Fargo/Moorhead Home Builders Care Foundation (a charitable arm of the Home Builders Association of Fargo-Moorhead) offer annual scholarships to incoming first-year and outstanding other students. In addition, many other scholarships, such as the Cossette Construction Management and Engineering Scholarship, Excellence in Construction Safety Scholarship, and Interstates Construction Management and Engineering Scholarship, are available to students. Students should check with the department for more information. Other forms of financial aid are available through the Office of Financial Aid and Scholarships.

CAREER OPPORTUNITIES

Construction management graduates are in high demand after graduation by contractors in all types of construction, from general contractors to specialty contractors. Positions available include superintendent, project manager, and construction executive. The starting salary for fresh graduates has been between $65,000 and $85,000 in recent years. Construction management students find summer internships or employment in the construction industry. The U.S. Bureau of Labor Statistics projects a 5-percent growth in employment for construction managers from 2022 to 2032 which is above the average growth rate for all occupations (3 percent).

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
CM&E 111	1	CM&E 212	3
CM&E 200	3	ENGL 120	3
ENGL 110	3	MATH 146	4
MATH 105 or 107	3	COMM 110	3
CHEM 121[1]	3	ECON 105, 201, or 202	3
CHEM 121L[1]	1	Social & Behavioral Sciences Gen Ed	3
	14		**19**

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
CM&E 204	3	CM&E 203	3
CM&E 250	3	CM&E 240	3
PHYS 211[1]	3	CM&E 260	3
PHYS 211L[1]	1	Humanities & Fine Arts Gen Ed	3
GEOL 105 or 106	3	Humanities & Fine Arts/ Cultural Diversity Gen Ed	3
ACCT 102 or 200	3		
	16		**15**
Junior			
Fall	**Credits**	**Spring**	**Credits**
CM&E 305	3	CM&E 301	3
CM&E 380	3	CM&E 315 or 715[3]	3
STAT 330	3	CM&E 405 or 605[3]	3
ENGL 320 or 321	3	BUSN 431[2]	3
MGMT 320[2]	3	MRKT 320 or FIN 320[2]	3
	15		**15**
Senior			
Fall	**Credits**	**Spring**	**Credits**
CM&E 403 or 603[3]	3	CM&E 450	3
CM&E 421	3	CM&E 453	3
CM&E 431	3	CM&E 488	3
Wellness Gen Ed	2	Business Admin Minor 300/400 Elective[2]	3
Business Admin Minor 300/400 Elective[2]	3	Business Admin Minor 300/400 Elective[2]	3
	14		**15**

Total Credits: 123

An overall minimum CGPA of 2.50 and a minor in Business Administration with a minor GPA of 2.50 are required to graduate with a B.S. in Construction Management.

1

All science courses require the companion lab with the exception of geology.

2

To be eligible for enrollment into 300/400 level courses offered by the College of Business requires application for a minor in Business Administration (BA).

3

Accelerated Master's program will allow students to take up to 9 credits of graduate-level courses that can be used to fulfill both the undergraduate-level and graduate-level curriculum requirements. A separate application for the accelerated program applies.

Construction Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/ccee/ (http://www.ndsu.edu/ccee/)
- **Credential Offered:**
  B.S.Cons.M.
- **Sample Program Guide:**

catalog.ndsu.edu/programs-study/undergraduate/construction-management/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/construction-management/#planofstudytext)

Major Requirements

Major: Construction Management

Degree Type: B.S.Cons.M.
Minimum Credits Required for Degree: 123

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Construction Management Core Requirements		
CM&E 111	Introduction to Construction Management and Engineering	1
CM&E 200	Construction Documents and Codes	3
CM&E 203	Building Construction: Methods and Materials	3
CM&E 204	Construction Surveying	3
CM&E 212	Construction Graphic Communications	3
CM&E 240	Financial Cost Concepts for Construction Managers	3
CM&E 250	Construction Statics and Mechanics	3

CM&E 260	Soils and Foundations	3
CM&E 301	Construction Technology and Equipment	3
CM&E 305	Pre-Construction Management	3
CM&E 315	Specifications and Contracts [1]	3
CM&E 380	Construction Estimating: Quantities and Costs	3
CM&E 403	Scheduling and Project Control [1]	3
CM&E 405	Construction Support Operations [1]	3
CM&E 421	Electrical and Mechanical Construction	3
CM&E 431	Sustainable Design and Construction	3
CM&E 450	Steel Design and Construction	3
CM&E 453	Concrete Design and Construction	3
CM&E 488	Construction Management Capstone	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
ENGL 320	Business and Professional Writing	3
or ENGL 321	Writing in the Technical Professions	
GEOL 105	Physical Geology	3
or GEOL 106	The Earth Through Time	
MATH 105	Trigonometry	3
or MATH 107	Precalculus	
MATH 146	Applied Calculus I	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
STAT 330	Introductory Statistics	3
Business Minor Courses (24 credit):		
ACCT 102	Fundamentals of Accounting	3
or ACCT 200	Elements of Accounting I	
Select one ECON course from the following:		3
ECON 105	Elements of Economics	
or ECON 201	Principles of Microeconomics	
or ECON 202	Principles of Macroeconomics	
MGMT 320	Foundations of Management	3
MRKT 320	Foundations of Marketing	3
or FIN 320	Principles of Finance	
BUSN 431	Business Law I-Contracts, Property and Torts	3
BA Minor 300/400 Elec. I [1]		3
BA Minor 300/400 Elec. II [1]		3
BA Minor 300/400 Elec. III [1]		3
Total Credits		**103**

Degree Requirements and Notes:

- An overall minimum cumulative GPA of 2.50 in all courses are required to graduate with a B.S. in Construction Management.
- 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.
- A cumulative GPA of 2.50 is required for both internal and external transfer students into this program.

Accelerated MBA Program Notes:

A maximum of 15 graduate credits may be used to satisfy both graduate and undergraduate degree requirements. Accelerated B.S.Cons.M./MBA students are to complete the following prescribed curriculum to meet that 15-credit limit.

1

The student in collaboration with a department advisor must identify the courses from the MBA program that will satisfy specific requirements in the undergraduate Construction Management program on the Accelerated Declaration form. Students are to complete the following graduate level classes in place of the required undergraduate course:

- CM&&E 715 for CM&E 315 (3 cr.)
- CM&E 603 for CM&E 403 (3 cr.)
- CM&E 605 for CM&E 405 (3 cr.)
- Three BA Minor 300/400 Electives (6 cr.)

Core Computer Science Competencies

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/core-computer-science-competencies/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/core-computer-science-competencies/)

The Core Computer Science Competencies certificate is comprised of those courses that anyone without a Computer Science degree may need for advanced course work or professions in computer science. CSCI 222 Discrete Mathematics includes an introduction into Boolean algebra and other mathematical concepts that form the basis of computer algorithms. CSCI 366 Database Systems addresses the theory and practice of relational database systems that underlay the vast majority of commercial software applications. CSCI 372 Comparative Programming Languages discusses concepts of some of the most important languages as well as similarities and differences between them. Programming knowledge equivalent to the Computer Science Foundations certificate is expected.

Core Computer Science Competencies

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/core-computer-science-competencies/ (http://catalog.ndsu.edu/programs-study/undergraduate/core-computer-science-competencies/)

Certificate Requirements

Core Computer Science Competencies

Required Credits: 9

Required Courses

Code	Title	Credits
CSCI 222	Discrete Mathematics	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3
or CSCI 312	Survey of Programming Languages	
Total Credits		**9**

Creative Writing

Department Information

- **Department Web Site:**
  www.ndsu.edu/english/ (http://www.ndsu.edu/english/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/creative-writing/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/creative-writing/)

The Creative Writing minor develops flexible and innovative thinkers who can apply their ideas and communication abilities in whatever career they choose. A Creative Writing minor offers students a rigorous practice in the craft of multiple poetic and storytelling genres, as well as opportunities to develop research skills, and skills in close reading and analysis of literary texts. Students pursuing this minor take a sequence of seven courses designed to develop design thinking, project management skills, analytic abilities, writing skills, and an understanding of creative processes. These skills are essential to the success of businesses and organizations in our region's fast-changing economy. The minor pairs well with majors in English Studies, Communication, Visual Arts, Theatre, Music, and other fields that value design thinking and creativity.

Creative Writing

Department Information

- **Department Web Site:**
  www.ndsu.edu/english/ (http://www.ndsu.edu/english/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/creative-writing/ (http://catalog.ndsu.edu/programs-study/undergraduate/creative-writing/)

Minor Requirements

Minor: Creative Writing

Minimum Credits: 21

Code	Title	Credits
ENGL 229	Introduction to Creative Writing	3
ENGL 272	Literary Analysis	3
ENGL 322	Writing and the Creative Process	3
ENGL 423	Creative Writing Studio	3
Select 6 credits from the following:		6
ENGL 323	Creative Writing (select from the options listed here)	
Creative Writing (Fiction - Fall semester)		
Creative Writing (Poetry - Spring semester)		
Creative Writing (Creative Non-Fiction - offered by demand)		
Creative Writing (Scriptwriting - offered by demand)		
Select one course from the following:		3
ENGL 251	British Literature I	
ENGL 252	British Literature II	
ENGL 261	American Literature I	
ENGL 262	American Literature II	
ENGL 326	Writing in the Design Professions	
ENGL 330	Women's Writing	
ENGL 333	Fantasy and Science Fiction	
ENGL 335	Multicultural Writers	
ENGL 336	Literature and The Environment	
ENGL 340	19th Century American Fiction	
ENGL 341	Contemporary American Fiction	
ENGL 345	Themes in American Culture	
ENGL 377	Modern Poetry	

ENGL 380	Shakespeare
ENGL 382	Film Genres and Styles
ENGL 385	British Fiction
ENGL 389	Non-fiction Prose
ENGL 435	Young Adult Literature in a Multicultural World
ENGL 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 486	Romantic Literature
Total Credits	**21**

Criminal Justice

Department Information

- **Department Web Site:**
  www.ndsu.edu/criminaljustice/ (http://www.ndsu.edu/criminaljustice/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/criminal-justice/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/criminal-justice/)

Criminal justice as a discipline is concerned with the broad areas of law enforcement, courts, law, and corrections, as well as criminological and legal theories which inform practice in these areas. The work of criminal justice practitioners include police patrol, criminal investigations, supervising juveniles on probation, practicing law, counseling and correctional work in institutions, group homes, or halfway houses. Criminal justice practitioners enjoy exciting professional challenges and opportunities for serving society and helping people.

The Program

During the past few years, the demand for professionals in criminal justice-related careers has increased significantly. Many criminal justice agencies and program administrators see a continuing need for qualified professionals. The criminal justice program at North Dakota State University has graduated students who have pursued criminal justice careers in local, state and federal agencies throughout the United States. The program is designed so our graduates will succeed in both beginning and advancing their criminal justice careers.

Faculty and Facilities

The criminal justice program is administered by faculty within the Department of Criminal Justice. Faculty provide teaching, research, and practical expertise related to many issues in criminal justice. The Fargo-Moorhead community provides a rich source of criminal justice education through a wide variety of criminal justice agencies that work with student interns.

Career Opportunities

Students graduating from this program have experienced much success in pursuing their career goals. Our alumni work in law enforcement, court system, law firms, correctional agencies, probation and parole departments and do so at the local, state and federal levels. These jobs typically come with good salaries and benefits, although this varies from agency to agency. Types of agencies that have employed our graduates include police departments, sheriff's departments, public policy and planning agencies, group homes, juvenile courts, family courts, probation and parole departments, juvenile and adult correctional institutions, halfway houses, and many federal agencies (e.g. U.S Marshals Service, Secret Service, and federal probation).

The Curriculum

The criminal justice curriculum is an interdisciplinary program drawing on the social sciences, behavioral sciences, humanities, and the law. Course requirements are based on the idea that our students should work through a curriculum that equips them with broad knowledge of the criminal justice system and criminological theory, and prepares them for a wide range of duties and professional responsibilities. The department also offers a minor in criminal justice and partners with the Department of Accounting and Information Systems on a fraud investigation minor.

Internship Program

Many students elect to complete internships. This is usually done during their junior or senior year. Internship opportunities exist in many agencies in North Dakota and Minnesota and can be done at any time during the calendar year. By completing an internship, students are able to combine the theoretical and applied aspects of professional preparation. Internship experience is an important element of successful job placement.

Criminal Justice Club

Students may expand their knowledge of criminal justice and career opportunities through the Criminal Justice Club. This student association allows participants to increase their knowledge and clarify career interests through field trips and meetings with professionals.

Accelerated Master's Program

Exceptional undergraduate students interested in pursuing a master's degree in criminal justice may apply during their junior year for admission into the department's accelerated master's program. This program allows students to complete certain courses which will count for both their bachelor's and master's degrees in criminal justice, thereby shortening the time it takes to complete the master's degree. Students interested in this option should consult with the department's graduate program coordinator or with their academic adviser.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
CJ 201	3	CJ 230	3
CJ 210	3	CJ 270	3
MATH 104 or 103	3	ENGL 120	3
ENGL 110	3	COMM 110	3
PSYC 111	3	SOC 110	3
	15		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CJ 330	3	CJ 325	3
STAT 330	3	Humanities / Fine Arts Gen Ed	3
Elective	5	Science/Tech Gen Ed (Global Perspectives)	3
Science Gen Ed w/ Lab	4	Minor	3
		Free Elective	3
	15		**15**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
CJ 406	3	CJ 407	3
CJ 461 or 410	3	CJ 410 or 461	3
Humanities / Fine Arts (Cultural Diversity) Gen Ed	3	Science/Tech Gen Ed	3
Upper Division Writing	3	Minor	3
Wellness Gen Ed	3	Free Elective	3
	15		**15**
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
CJ 465	3	CJ 460	3

Minor	3	Minor	3
Minor	3	Minor	3
Minor	3	Minor or 300-400 level elective	3
CJ Elective	3	Free Elective	3
	15		**15**

Total Credits: 120

Criminal Justice

Department Information

- **Department Web Site:**
  www.ndsu.edu/criminaljustice/ (http://www.ndsu.edu/criminaljustice/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/criminal-justice/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/criminal-justice/#planofstudytext)

Major Requirements

Major: Criminal Justice

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**
Category A: Humanities and Fine Arts †		**6**
Category B: Social and Behavioral Sciences †		**6**
Category W: Wellness †		**2**
Category D: Cultural Diversity *†		

Category G: Global Perspectives [*†]	
Total Credits	**39**

*

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
CJ 201	Introduction to Criminal Justice	3
CJ 210	Introduction to Policing	3
CJ 230	Criminology	3
CJ 270	Introduction to Corrections	3
CJ 325	Applied Research Methods	3
CJ 330	Criminal Law and Procedure	3
CJ 406	Crime and Delinquency [1]	3
CJ 407	Deviant Behavior [1]	3
CJ 460	Criminal Court System [1]	3
CJ 461	Corrections [1]	3
or CJ 410	Police & Society	
CJ 465	Gender, Race and Ethnicity in Criminal Justice [1]	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
SOC 110	Introduction to Sociology (May satisfy general education category B)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Criminal Justice Elective: Select 3 additional CJ prefix credits.		3
Using CJ 494 or CJ 496 to fulfill these electives requires permission from the department chairperson.		
Total Credits		**45**

1

Students approved to complete the accelerated B.S. in Criminal Justice to M.S. in Criminal Justice program will take the graduate level courses (CJ 606 Crime and Delinquency, CJ 607 Deviant Behavior, CJ 660 Criminal Court System, CJ 661 Corrections, and CJ 665 Gender, Race and Ethnicity in Criminal Justice).

Minor Requirements

Minor: Criminal Justice

Required Credits: 18

Code	Title	Credits
Required Courses		
CJ 201	Introduction to Criminal Justice	3
CJ 210	Introduction to Policing	3
CJ 230	Criminology	3
CJ 270	Introduction to Corrections	3
CJ 300-400 Level	6 credits of CJ credits at the 300-400 level required. Using CJ 494 and CJ 496 to fulfill these electives requires permission from the department chairperson. [*]	6
Total Credits		**18**

*

Students who do not complete a Research Methods course in their major program of study will be required to complete CJ 325 Applied Research Methods as part of their minor requirement.

Crop and Weed Science

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/plantsciences (http://www.ag.ndsu.edu/plantsciences/)
- **Credential Offered:**
  B.S.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/crop-weed-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/crop-weed-science/)

The Crop and Weed Sciences (CWS) major in the Department of Plant Sciences is the study of grain and forage crop production, weed science, genetics, plant breeding, crop physiology, and plant biotechnology. North Dakota is consistently a national leader for production of hard red spring wheat, durum wheat, barley, flax, dry edible beans, canola, dry peas, lentils, and sunflower. North Dakota also ranks in the top 10 states for production of several other agronomic crops, including oat, rye, sugarbeet, and grass hay, and usually ranks third in total acreage of crops harvested. Income from sales of crops accounts for more than half of the North Dakota farmers' annual cash income. Crops utilized as livestock feed account for much of the cash income credited to livestock sales. Thus, North Dakota State University offers a setting well-suited for the study of Crop and Weed Sciences.

Career Opportunities

More employment opportunities often are available in CWS than there are qualified graduates. Producers require annual inputs such as seed, fertilizers, and herbicides, so they seek assistance in sales or service areas such as crop consulting, chemical application, and soil testing each year. Therefore, opportunities for CWS graduates usually have been more stable than in employment areas where inputs can be deferred when income is low. Also, salaries for CWS graduates are at or near the top among all graduates in agriculture due to the high demand for agronomists by many companies.

The employment opportunities in CWS can best be summarized by the jobs that our graduates have accepted. Our graduates have been employed as crop production consultants (agronomists); marketing experts for herbicides, fertilizers and other agricultural chemicals; managers of farm service centers for cooperatives and elevators; agents in the production and marketing of certified seeds; research technicians for private companies and universities; natural resources conservationists and agents for other governmental agencies; county agricultural extension agents; field representatives for sugarbeet or food processing companies; farm managers; farm insurance agents; research associates with private plant breeding companies; and persons involved in the reclamation of strip-mined land.

Typically 10 to 15 percent of the CWS graduates at NDSU return to farming or ranching and 5 to 10 percent continue their studies to receive graduate degrees. The median starting salary for a CWS graduate with a bachelor's degree was $52,000 in 2022. In addition, benefits packages that include health, dental, and retirement are very competitive, signing bonuses and performance bonuses might be available, and some positions include access to a vehicle and cell phone.

Many employers hire undergraduate students as interns for the summer months, and some hire for spring-summer semester or summer-fall semester periods. Several faculty hire students to help with research activities, and the Department of Plant Sciences also sponsors summer interns with an expressed interest in graduate school. The opportunities for summer interns, beginning with students between their freshman and sophomore years, have exceeded the supply of students for several years. The salary for interns is competitive with the income for alternative summer jobs, and the strong market has resulted in wage rates as high as $22/hr with signing bonuses and some employers pay potential internship fees if taken for summer term credit. An internship provides excellent work experience and often results in a graduating senior being hired earlier and with a higher salary than students without comparable experience.

Financial Aid and Scholarships

Loans, scholarships, grants, and the work-study program are available through Financial Aid and Scholarships. Students requiring assistance may contact the Office of Financial Aid and Scholarships or One Stop.

The Department of Plant Sciences awards several scholarships for use during the freshman, sophomore, junior, and senior years. Additionally, certain scholarships are awarded by the College of Agriculture, Food Systems, and Natural Resources. Applications for all college and departmental scholarships may be applied for online between December 1 and March 1, annually. Also, many undergraduate students are employed part-time during the school year and full-time during the summer months to assist with research or teaching activities.

Extra-Curricular Opportunities

The department sponsors the NDSU Agronomy Club. The Agronomy Club invites industry and academic experts to speak about professional opportunities and activities at club meetings. The club also arranges trips to local agriculture businesses and arranges community outreach activities. The Agronomy Club participates in regional and national contests that involve crop production and weed science. And the club annually attends conventions to learn about several aspects of agriculture in the North Central region.

There are nearly 300 other Clubs and Organizations available at NDSU. Many of these focus around a discipline or interest area, just as the Agronomy Club targets the disciplines and professions encompassed by the CWS major, but you are not required to be in the major or minor to join these clubs. We welcome all students with an interest in Agronomy to join us whether you have background in crop production or just want to find out more about crop production and the industry opportunities.

CWS Major curriculum Options

The department offers four options in the CWS major: agronomy, biotechnology, science and weed science. This is an emphasis, subplan, or track as part of the CWS major to allow refinement in the direction of each student's career preparation. All students majoring or double majoring in CWS must meet the listed requirements for the core CWS program and one selected option. Students interested in a specific option will replace several of the elective courses listed in the sample curriculum with specific courses appropriate for that option.

- Agronomy – This option is the most popular. It deals with the technical aspects of agricultural production and management. It provides the most elective credits, which allows students to select courses that complement special interests in farming, marketing, business management, county extension work, etc.
- Biotechnology – This option is intended for students who wish to work as a technician or pursue graduate study in the crop biotechnology area.
- Science – This option deals with application of chemistry, botany, mathematics, and physics to CWS. It is an excellent curriculum option for students intending to pursue a graduate degree in CWS. The additional science and math component also provides good training for students pursuing careers in analysis and residue testing of soil, water, and plant tissue samples.
- Weed Science – This option, which emphasizes proper use of herbicides and other agricultural chemicals, meets the demand for qualified personnel in marketing and application of agricultural chemicals. Also, this option provides a good background for crop production consultants (agronomists) and plant protection careers. The emphasis balances crop production coursework with more requirements in weed science, entomology, plant pathology and soil science.

In addition, some faculty in plant sciences advise students interested in the Biotechnology or Agricultural Sciences majors. The Biotechnology major is an interdisciplinary program that stresses basic and applied science courses and lab experience to prepare students for employment in the biotechnology industry or for graduate study. The Agricultural Sciences program exposes students to disciplines within agriculture for careers with diverse course needs. This exposure is strengthened through selection of pertinent coursework in a minimum of three discipline areas.

cws minor

Any NDSU student with a major other than CWS can elect the CWS minor. The minor includes 18 credits of coursework and includes the foundation courses in crops and production practices with broad flexibility to explore specific crop production, pest management, soil aspects, or genetics courses. The CWS minor will give familiarity with terms and practices within crop production to assist student preparation in a related discipline. Sales and marketing managers of agronomic inputs or commodities, publication or promotion firms writing about or for Agriculture industries, animal operations that need forages and crops for feed, or soil conservationists who need to consider acceptable farming practices to meet Farm Bill criteria and stipulations are among the individuals and situations where the CWS minor would provide good supplement to another major.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
PLSC 189	1	BIOL 151	3
PLSC 110	3	BIOL 151L	1
BIOL 150	3	ENGL 120	3
BIOL 150L	1	Gen Ed Social & Behavioral Sci	3
ENGL 110	3	Gen Ed Wellness	2
MATH 103	3	Free Elective	3
	14		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
PLSC 215	1	PLSC 225	3
SOIL 210	3	PLSC 312	1

CHEM 121	3	MICR 202	2
CHEM 121L	1	MICR 202L	1
COMM 110	3	CHEM 122	3
Gen Ed Humanities/Fine Arts & Cult Diversity	3	CHEM 122L	1
Free Elective	3	ECON 201	3
		STAT 330	3
	17		**17**

Third Year			
Fall	**Credits**	**Spring**	**Credits**
PLSC 420	3	PLSC 315	3
PPTH 324	3	PLSC 315L	1
ENT 350	3	PLSC 323	3
Gen Ed Humanities/Fine Arts	3	SOIL 322	3
CHEM 240, BIOL 461, or BIOC 260 (BIOC 260 is spring course with prerequiite CHEM 140 in fall)	3	PLSC 380	3
		Free Elective	3
	15		**16**

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
PLSC upper level elective	2	PLSC 455	3
PLSC upper level elective	2	PLSC 491	1
Gen Ed Upper Level Writing (recommend ENG 320, 321, or 324)	3	Free Elective	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
	13		**13**

Total Credits: 120

Crop and Weed Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/agriculture/academics/academic-units/plant-sciences/undergraduate-majors/crop-and-weed-sciences (http://www.ndsu.edu/agriculture/academics/academic-units/plant-sciences/undergraduate-majors/crop-and-weed-sciences/)
- **Credential Offered:**
  B.S.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/crop-weed-science/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/crop-weed-science/#planofstudytext)

Major Requirements

Major: Crop & Weed Sciences

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Required Courses for Crop & Weed Sciences		
PLSC 189	Skills for Academic Success	1
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
ECON 201	Principles of Microeconomics	3
ENT 350	General Entomology	3
PLSC 110	World Food Crops	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 380	Principles of Plant Physiology	3
PLSC 420	Integrated Forage and Cover Crops Production Management and Ecosystem Services [2]	3
PLSC 323	Principles of Weed Science	3
PLSC 455	Cropping Systems:An Integrated Approach [2]	3
PLSC 491	Seminar	1
PPTH 324	Introductory Plant Pathology	3
SOIL 210	Introduction to Soil Science	3
STAT 330	Introductory Statistics	3
Options: Select one from the following four option areas:		
The standard default option for the major is Agronomy. Student wishing to pursue a different option must officially declare that option with the Office of Registration and Records.		16-27
Total Credits		**73-84**

Agronomy Option

For students interested in production agriculture.

Code	Title	Credits
Agronomy Requirements		
BIOL 461	Plant Ecology [2]	3-4
or BIOC 260	Elements of Biochemistry	
or CHEM 240	Survey of Organic Chemistry	
MATH 103	College Algebra (or higher)	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
SOIL 322	Soil Fertility and Fertilizers	3
PLSC 300-400	(No more than 2 credits of co-op allowed) [2]	4
Total Credits		**16-17**

Biotechnology Option

For students interested in the biotechnology industry or pursuing graduate study in crop biotechnology.

Code	Title	Credits
Biotechnology Requirements		
BIOC 460	Foundations of Biochemistry and Molecular Biology I [2]	3
MATH 105	Trigonometry	3-4
or MATH 146	Applied Calculus I	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PLSC 453	Advanced Weed Science [2]	2-3
or PLSC 431	Intermediate Genetics	
PLSC 484	Plant Tissue Culture and Biotechnology [2]	3
Total Credits		**16-18**

Science Option

For students interested in advanced study and foundational studies.

Code	Title	Credits
Science Requirements		
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
MATH 146	Applied Calculus I	4
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3

PLSC 300-400	(No more than 2 credits of co-op may be used) [2]	4
Science and Math Electives	BIOC, BIOL, CHEM, MATH, MICR, and STAT prefix courses (100-400 level)	12
Total Credits		**27**

Weed Science Option

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

Code	Title	Credits
Weed Science Rquirements		
CHEM 240	Survey of Organic Chemistry	3-4
or BIOC 260	Elements of Biochemistry	
ENT 431	Principles of Insect Pest Management [2]	3
MATH 103	College Algebra (or higher level)	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
PLSC 433	Weed Biology and Ecology [2]	2
PLSC 453	Advanced Weed Science [2]	2
PPTH 454	Diseases Of Field and Forage Crops [2]	3
SOIL 322	Soil Fertility and Fertilizers	3
Total Credits		**22-23**

Degree Requirements and Notes

- The major allows no more than 6 credits of cooperative education (co-op) to be counted toward degree requirements.

1

PLSC 189 is only required for first-time, first-year students. These are students who have not yet completed a college course as a college student. Student that are not first-time, first-year students that either transfer into the university or change their major are not required to take this requirement.

2

Students who are approved to complete the accelerated program in the Master of Science in Plant Sciences are eligible to complete the 600 level course with graduate supervisor approval. Students are allowed to take 15 graduate credits and apply the graduate credit to these undergraduate program requirements. Students are required to complete the Accelerated Degree Student Declaration form and make formal application to the NDSU Graduate School.

Minor Requirements

Minor: Crop & Weed Science

Minimum Required Credits: 18

Code	Title	Credits
Required		
PLSC 110	World Food Crops	3
PLSC 225	Principles of Crop Production	3
Elective Courses: Select two of the following:		**6-7**
PLSC 315 & 315L	Genetics and Genetics Laboratory (both must be taken to count as one selection)	
PLSC 320	Integrated Forage and Cover Crops Production Management and Ecosystem Services	
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.

Cultural Diversity

Department Information

- **Department Web Site:**
  www.ndsu.edu/socanth/ (http://www.ndsu.edu/socanth/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/cultural-diversity/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/cultural-diversity/)

The Cultural Diversity minor provides knowledge and skills to critically think about issues of diversity. It is a minor that can complement a variety of degree programs. The courses in this minor provide tools to help students better understand individual and societal experiences of diverse cultures and communities. Learning about other cultures helps us understand different perspectives within the world in which we live, something that is a valuable skill to take into any prospective career trajectory. The courses aim to strengthen students' understanding of how race, class, gender, ethnicity, nationality, and sexuality interact to define identities and shape social relations.

Cultural Diversity

Department Information

- **Department Web Site:**
  www.ndsu.edu/socanth/ (http://www.ndsu.edu/socanth/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/programs-study/undergraduate/cultural-diversity/ (http://catalog.ndsu.edu/programs-study/undergraduate/cultural-diversity/)

Minor Requirements

Minor: Cultural Diverstiy

Minimum Requirements: 18

Code	Title	Credits
SOC 110	Introduction to Sociology	3
or ANTH 111	Introduction to Anthropology	
SOC 235	Cultural Diversity	3
TIPS 101	Introduction to Native American & Indigenous Studies	3
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	3
Electives: Select 6 credits from the following:		6
ANTH 332	Medical Anthropology	
ANTH 442	Feminist Anthropology	
ANTH 446	Anthropology of Latin America	
ANTH 458	Indigenous Peoples and Cultures of the Upper Midwest	
SOC 116	Global Social Problems	
SOC 410	Social Inequality	
SOC 412	Sociology of Gender	
SOC 424	Feminist Theory and Discourse	
Total Credits		**18**

Cybersecurity

Department Information

- **Department Web Site:**
  https://www.ndsu.edu/cs/
- **Credential Offered:**
  B.S.; UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/cybersecurity/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/cybersecurity/)

The B.S. in Cybersecurity is designed to provide students with the knowledge and skills to allow students to succeed in the rapidly growing field of cybersecurity. It will prepare students to identify security issues with computing systems and networks, prior to attacks, and to detect and respond to ongoing attacks. This program will provide students with the skills that they will need to understand and respond to the computing, cybersecurity and relevant scientific challenges of today and tomorrow. Students will be prepared for entry level positions in a number of careers, such as cybersecurity analyst, defensive cybersecurity, penetration testing and computer and network forensics.

The cybersecurity certificate draws from the set of courses that are specific to the B.S. in Cybersecurity and the Cybersecurity track of B.S. in Computer Science degrees. The certificate can be of interest to professionals with computer science degrees who wish to expand their expertise in the area of cybersecurity. It is also targeted at current students who complete a different track of the B.S. in Computer Science and wish to cover more than one specialization.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
CSCI 105		3	ENGL 120	3
ENGL 110		3	CSCI 160	4
COMM 110		3	Gen Ed Wellness	2
CSCI 159		3	Gen Ed HUM/FA & Glob Persp	3
Gen Ed Science/Tech & Lab		4	Gen Ed Soc/Beh Sci & Cult Div	3
		16		**15**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
MATH 146		4	STAT 331 or 368[1]	2-3
CSCI 161		4	CSCI 277	3
CSCI 222		3	Cyber Elective	3
STAT 330 or 367[1]		3	Gen Ed Science/Tech	3
CSCI 359		3		
		17		**12**
Junior				
Fall	**Credits**		**Spring**	**Credits**
CSCI 366		3	CSCI 371	3
CSCI 403		3	CSCI 374	3
CSCI 305		3	CSCI 404	3
Gen Ed Soc/Beh Sci		3	ENGL 321 or 324	3
Gen Ed HUM/FA		3	Free Elective	3
		15		**15**
Senior				
Fall	**Credits**		**Spring**	**Credits**
CSCI 474		3	CSCI 445	3
CSCI 409		3	CSCI 408	3

CSCI 410	3	CSCI 411	2
Cyber Elective	3	Free Elective	3
Free Elective	3	Free Elective	4
	15		**15**

Total Credits: 120

[1]

MATH 165/166 are required if taking the STAT 367 & 368 sequence.

Cybersecurity

Department Information

- **Department Web Site:**
  https://www.ndsu.edu/cs/
- **Credential Offered:**
  B.S.; UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/cybersecurity/ (http://catalog.ndsu.edu/programs-study/undergraduate/cybersecurity/)

Degree Requirements

Major: Cybersecurity

Degree Type: Bachelor of Science (B.S.)
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
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7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

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ENGL 120	College Composition II	
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Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**
Category A: Humanities and Fine Arts †		**6**
Category B: Social and Behavioral Sciences †		**6**
Category W: Wellness †		**2**
Category D: Cultural Diversity *†		

Category G: Global Perspectives [*†]	
Total Credits	**39**

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
CSCI 105	Introduction to Cybersecurity	3
CSCI 159	Computer Science Problem Solving	3
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 222	Discrete Mathematics	3
CSCI 277	Introduction to UNIX	3
CSCI 366	Database Systems	3
CSCI 371	Web Scripting Languages	3
CSCI 374	Computer Organization and Architecture	3
CSCI 403	Defensive Network Security	3
CSCI 404	Ethical Hacking	3
CSCI 405	Principles of Cybersecurity	3
CSCI 408	Malware Detection, Analysis and Threat Mechanisms	3
CSCI 409	Cybersecurity Law and Policy	3
CSCI 410	Computer Crime and Forensics	3
CSCI 411	Secure Software Development	2
CSCI 445	Software Projects Capstone	3
CSCI 359	Networking	3
CSCI 474	Operating Systems Concepts	3
ENGL 321	Writing in the Technical Professions	3
or ENGL 324	Writing in the Sciences	
MATH 146	Applied Calculus I	4
or MATH 165	Calculus I	
STAT 367	Probability	3
or STAT 330	Introductory Statistics	
STAT 368	Statistics	3
or STAT 331	Regression Analysis	
Select 6 credits of Cyber Electives from the following:		6
CSCI 213	Modern Software Development	
CSCI 412	Mobile Software Engineering	
CSCI 462	Mobile and Wireless Networks	
CSCI 706	Data-Driven Security (with department permission)	
EMGT 150		
EMGT 435		
MATH 473	Cryptology	
Total Credits		**77**

Certificate Requirements

Cybersecurity

Required Credits: 9

Required Courses

Code	Title	Credits
CSCI 403	Defensive Network Security	3
or CSCI 405	Principles of Cybersecurity	
CSCI 404	Ethical Hacking	3
Select one course from the following:		3
CSCI 277	Introduction to UNIX	
CSCI 403	Defensive Network Security (if not used above)	
CSCI 405	Principles of Cybersecurity (if not used above)	
CSCI 409	Cybersecurity Law and Policy	
CSCI 410	Computer Crime and Forensics	
CSCI 469	Network Security	
CSCI 473	Foundations of the Digital Enterprise	
Total Credits		**9**

Data Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/data-science/ (http://catalog.ndsu.edu/programs-study/undergraduate/data-science/)

Degree Requirements

Major: Data Science

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**

Category A: Humanities and Fine Arts †	**6**
Category B: Social and Behavioral Sciences †	**6**
Category W: Wellness †	**2**
Category D: Cultural Diversity *†	
Category G: Global Perspectives *†	
Total Credits	**39**

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Code	Title	Credits
Major Core Requirements		
Select one from the following:		3
CSCI 114	Computer Applications	
TL 116	Business Software Applications	
CSCI 159	Computer Science Problem Solving	
ENGL 321	Writing in the Technical Professions	3
or ENGL 324	Writing in the Sciences	
BUSN 380	Business Analytics: Business Problem Solving with Spreadsheets	3
MATH 165	Calculus I	4
MATH 166	Calculus II	4
STAT 367	Probability	3
STAT 368	Statistics	3
STAT 412	Statistics for Data Science using R	3
MIS 340	Applied Business Intelligence	3
MIS 479	Business Data Mining and Predictive Analytics	3
CSCI 312	Survey of Programming Languages	3
CSCI 222	Discrete Mathematics	3
CSCI 227	Computing Fundamentals in Python I	3
CSCI 228	Computing Fundamentals in Python II	3
CSCI 161	Computer Science II	4
CSCI 366	Database Systems	3
Select one from the following:		3
PHIL 216	Business Ethics	
CSCI 489	Social Implications of Computers	
ENGR 327	Ethics, Engineering, and Technology	
Major Track		
Select one track from below to complete the major		12
Total Credits		**66**

Track One: Artificial Intelligence

Code	Title	Credits
Select 12 credits from the following:		12
CSCI 313	Software Development with Frameworks	
CSCI 420	Introduction to Data Science in Python	
CSCI 422	Fundamentals of Data Engineering	
CSCI 425	Machine Learning	
CSCI 426	Introduction to Artificial Intelligence	
CSCI 428	Artificial Intelligence, Ethics, and the Environment	
CSCI 450	Cloud Computing	

CSCI 479	Introduction to Data Mining (Introduction to Data Mining)	
Total Credits		**12**

Track Two: Statistical Data Analytics

Code	Title	Credits
STAT 460	Applied Survey Sampling	3
STAT 462	Introduction to Experimental Design	3
STAT 463	Nonparametric Statistics	3
STAT 464	Discrete Data Analysis	3
Total Credits		**12**

Track Three: Business Analytics

Code	Title	Credits
MRKT 466	Digital Marketing Analytics	3
SCM 330	Supply Chain Analysis and Analytics	3
SCM 455	Supply Chain Technology Enablers	3
MIS 350	Enterprise Systems	3
Total Credits		**12**

Track Four: Generalist

Code	Title	Credits
Select any courses from Tracks 1-3 or list below for a total of 12 credits.		12
IME 470	Operations Research I	3

Certificate Requirements

Certificate: Data Science

Minimum Credits: 9

Code	Title	Credits
CSCI 420	Introduction to Data Science in Python	3
CSCI 422	Fundamentals of Data Engineering	3
or CSCI 425	Machine Learning	
or CSCI 426	Introduction to Artificial Intelligence	
Select one course from the following:		3
CSCI 422	Fundamentals of Data Engineering (if not used above)	
CSCI 425	Machine Learning (if not used above)	
CSCI 426	Introduction to Artificial Intelligence (if not used above)	
CSCI 428	Artificial Intelligence, Ethics, and the Environment	
CSCI 436	Intelligent Agents	
CSCI 450	Cloud Computing	
CSCI 479	Introduction to Data Mining	
GEOG 455	Introduction to Geographic Information Systems	
Total Credits		**9**

Data Science

Department Information

- **Department Web Site:**
  https://www.ndsu.edu/cs/
- **Credential Offered:**
  B.S.

- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/data-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/data-science/)

The Major

The data science degree program is designed to equip students with advanced skills for success in today's data-driven world. This strategic program seamlessly blends statistics, computer science, and business, providing a deep understanding of data analysis, predictive modeling, and machine learning techniques while establishing a robust foundation in statistical methodologies and computational proficiency.

Students will learn how to navigate data collection, interpretation, and cleaning intricacies, simultaneously mastering programming languages and tools crucial for efficient data manipulation and analysis. Through a specialized focus on statistics, students gain expertise to extract valuable insights from complex datasets, making informed data-driven decisions, and expertly communicate findings to diverse audiences.

The Certificate

The Data Science certificate draws from the set of courses that are specific to the Data Science track of the B.S. in Computer Science degree. It can be of interest to professionals with computer science degrees who wish to expand their expertise in the area of data science. It is also targeted at current students who complete a different Computer Science track or another major program and wish to cover more than one specialization.

Economic Computation

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/agecon (http://www.ag.ndsu.edu/agecon/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/economic-computation/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/economic-computation/)

The undergraduate certificate in economic computation places students at the forefront of technology and analytical skills. The program is intended to equip undergraduate students with applied skills in economic computation to analyze economic data and succeed in finding both post-graduate employment and pursuing graduate education. This certificate provides both theory to guide interpretation of economic data and applied statistical skills. Courses in computation and econometrics provide an opportunity for students to master both sets of skills in a relatively short period of time. Economic theory and the econometric and computational tools provided by the certificate offer students the opportunity to integrate methodologically grounded interpretation of empirical observations into discussion concerning policies at all levels of institutions, both public and private.

Economic Computation

Department Information

- **Department Location:**
  500 Richard H. Barry Hall
- **Department Phone:**
  701-231-7441
- **Department Web Site:**
  www.ag.ndsu.edu/agecon (http://www.ag.ndsu.edu/agecon/)
- **Credential Offered:**
  Undergraduate Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/economic-computation/ (http://catalog.ndsu.edu/programs-study/undergraduate/economic-computation/)

Certificate Requirements

Economic Computation

Required Credits: 12

Code	Title	Credits
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3

ECON 211	Introduction to Computational Economics	3
ECON 410	Econometrics [1]	3
or ECON 411	Computational Economics	
Total Credits		**12**

1

Additional course prerequisites for ECON 410 and ECON 411 are required.

Economics

Department Information

- **Department Web Site:**
  www.ndsu.edu/agecon/ (http://www.ndsu.edu/agecon/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/economics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/economics/)

Economics is the social science that deals with problems of choice and decision making. It does so through a systematic and logical framework for analyzing how society and individuals solve such problems as what goods and services to produce, how to organize production and for whom goods and services are to be produced. Knowledge of economics is necessary for understanding and dealing intelligently with topics such as domestic and global economic development, environmental and natural resource management, renewable energy policy, international trade, government finance and market failure.

Background Information

Besides being important for understanding contemporary social issues, economics is useful in developing career skills for business, law, teaching, public administration and research. If you enjoy the challenge of understanding how the economy works and how economic concepts are used in making decisions, economics offers a stimulating and rewarding career.

The Program

The study of economics has a long tradition at North Dakota State University. A student pursuing an economics major at NDSU has the advantage of receiving instruction from a well-established and strong faculty. Economics courses are taken by students in all colleges on campus, so classes provide an opportunity to broaden one's understanding through interaction with other students.

The Department offers three tracks within the economics major: a general economics track, a quantitative economics track, and a business economics track.

- The general economics track offers students more flexibility in terms of economics field course selection.
- The quantitative economics track is designed for students who desire to pursue a graduate degree in economics after earning a bachelor's degree, or for students who desire a quantitative approach to economics. Students with strong quantitative and/or statistical backgrounds are highly encouraged to select the quantitative economics track.
- The business economics track is designed for economics students seeking business-oriented careers; it requires students to complete specific business and accounting courses offered through the College of Business.

During the freshman and sophomore years, the program requires basic college courses such as English, mathematics, science, communication and information technology. The introduction to economics includes 1) microeconomics, the study of relative prices and the consequences of different market forms, and 2) macroeconomics, the study of such topics as the general level of prices, employment and output.

Economics majors take a one-year sequence in intermediate economic theory. Students enhance their ability to explain and use fundamental microeconomics and macroeconomics concepts and are further exposed to relationships between governments and markets. These concepts and relationships establish the foundation a student needs to deal with current economic issues.

Economics students take elective courses to develop areas of emphasis such as development economics, international economics, industrial organization, public economics, health economics, natural resource economics, economics of entrepreneurship, and environmental economics. A representative program for the major in economics is summarized on the back of this page. A major in economics also can be combined with a variety of minors and other majors and still be completed in four years. The concepts of economics can be applied to many fields. A minor in economics may be selected in combination with most other majors on campus, including business.

Career Opportunities

Graduates with degrees in economics are in high demand, with economics consistently being among the top five majors wanted by employers. Business, industry, government service and teaching are some of the possible areas of employment for the economist. The study of economics also provides excellent preparation for graduate education in areas such as business, economics and law.

High School Preparation

It is recommended that high school students interested in studying economics at the university level concentrate on developing their mathematical and writing skills.

The Faculty

The economics faculty within the Department of Agribusiness and Applied Economics is student and academic oriented. The low student to faculty ratio in upper division economic courses provides close relationships and an interactive learning environment.

Financial Aid and Scholarships

A number of scholarships are available to outstanding agribusiness and applied economics majors. The College of Agriculture, Food Systems, and Natural Resources awards scholarships each year. For more information on scholarships, go to: https://www/ndsu.edu/admission/scholarships/.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ECON 189[1]	1	ECON 201	3
COMM 110	3	ENGL 120	3
ENGL 110	3	MATH 144	4
TL 116	3	Humanities/Fine Arts & Cultural Diversity Gen Ed	3
Humanities & Fine Arts Gen Ed	3	Free Elective	3
Wellness Gen Ed	2		
	15		**16**
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ECON 202	3	ECON 341	3
STAT 330 or 367	3	STAT 331 or ECON 410	2
ECON 211	3	Additional Social & Behavioral Requirement Standard Option	3
Science & Tech Gen Ed	3	Science & Tech w/ Lab Gen Ed	4
Additional Social & Behavioral Requirement Standard Option	3	Free Elective	3
	15		**15**
Junior			
Fall	**Credits**	**Spring**	**Credits**
ECON 343	3	Upper Division Writing Gen Ed	3
Economics Standard Option Elective	3	Economics Standard Option Elective	3
Economics Standard Option Elective	3	Economics Standard Option Elective	3
Minor Course	3	Minor Course	3

Free Elective	3	Minor Course	3
	15		**15**

Senior

Fall	Credits	Spring	Credits
ECON 440, 461, 470, 475, or 480 (Capstone - Select One)	3	Minor Course	3
Economics Standard Option Elective	3	Free Electives	11
Minor Course	3		
Minor Course	3		
Free Electives	3		
	15		**14**

Total Credits: 120

[1]

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

Economics

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/agecon (http://www.ag.ndsu.edu/agecon/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/economics/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/economics/#planofstudytext)

Major Requirements

Major: Economics

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	

COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**
Category A: Humanities and Fine Arts †		**6**
Category B: Social and Behavioral Sciences †		**6**
Category W: Wellness †		**2**
Category D: Cultural Diversity *†		
Category G: Global Perspectives *†		
Total Credits		**39**

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements for all options

Code	Title	Credits
Economics Core Requirements		
ECON 189	Skills for Academic Success [1]	1
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
ECON 341	Intermediate Microeconomics	3
ECON 343	Intermediate Macroeconomics	3
TL 116	Business Software Applications	3
Capstone		3
ECON 440	Game Theory and Strategy	
ECON 461	Economic Development	
ECON 470	Public Economics	
ECON 475	Health Economics	
ECON 480	Industrial Organization	
Program Option: Select one of three options to complete the major:		33-47
1) Standard		
2) Quantitative		
3) Business Economics		
Total Credits		**52-66**

1

ECON 189 is only required for first-time, first-year students--A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take ECON 189. If a student has completed another NDSU [Prefix] 189 course, this will substitute for ECON 189.

Standard Option

NOTE: Students selecting the Standard Option may complete either a Bachelor of Science or a Bachelor of Arts degree.

Code	Title	Credits
Standard Option Requirements		
MATH 144	Mathematics for Business	4
STAT 330	Introductory Statistics	3
or STAT 367	Probability	
STAT 331	Regression Analysis [2]	2-3
or ECON 410	Econometrics	
Economics Electives		15

Select 15 credits from the list below. Students may select no more than 6 credits from the list of approved non-economics courses, including ECON 324 and ECON 356, as part of the 15 credits of economics electives.		
ECON 402	Economics of Entrepreneurship	
ECON 410	Econometrics [2]	
ECON 411	Computational Economics	
ECON 440	Game Theory and Strategy (if not taken as capstone)	
ECON 461	Economic Development (if not taken as capstone)	
ECON 465	Labor Economics	
ECON 470	Public Economics (if not taken as capstone)	
ECON 472	International Trade	
ECON 475	Health Economics (if not taken as capstone)	
ECON 476	Monetary Theory and Policy	
ECON 480	Industrial Organization (if not taken as capstone)	
ECON 481	Natural Resource Economics	
ECON 482	Environmental Economics	
Select no more than 6 credits from the following as part of the 15 credits of economics electives:		
AGEC 339	Quantitative Methods & Decision Making	
AGEC 344	Agricultural Price Analysis	
AGEC 346	Applied Risk Analysis	
AGEC 347	Principles of Real Estate	
AGEC 445	Agribusiness Industrial Strategy	
AGEC 446	Agribusiness Finance	
BUSN 487	Managerial Economics	
ECON 324	Money and Banking	
ECON 356	History of Economic Thought	
FIN 410	Investment Analysis and Management	
FIN 420	Options, Futures, and Other Derivatives	
FIN 430	Management of Financial Institutions	
FIN 440	International Finance	
FIN 450	Advanced Bank Management	
FIN 460	Corporate Finance	
Additional Social & Behavioral Requirements		6
In addition to the 6 credits for general education, students must complete 6 credits of social and behavioral sciences. Three credits must be selected from the current general education list while the remaining 3 credits may be any course with a prefix of: ANTH, CJ, GEOG, POLS, PSYC, or SOC.		
Bachelor of Science or Bachelor of Arts Requirements - A student must select either a BS or BA degree. The following requirements apply to the specific degree type selected:		3-16+
Bachelor of Science: Completion of a minor program of study. This minor must be officially declared through the Office of Registration and Records. (Minimum 16 credits)		
Bachelor of Arts: Completion of the BA Langauge Proficiency requirements and 3 credits of 300-400 level humanities, social sciences or a study abroad experience. (Credits for language proficiency will vary depending on placement; 3-14 credits)		
Total Credits		**33-47**

2

STAT 331 is waived if ECON 410 is taken.

Quantitative Economics option

NOTE: Students selecting the Quantitative Economics Option complete a Bachelor of Science degree only.

Code	Title	Credits
Quantitative Economics Option Requirements		
CSCI 122	Visual BASIC	3
or CSCI 159	Computer Science Problem Solving	
ECON 410	Econometrics	3

or ECON 411	Computational Economics	
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3-4
or MATH 265	Calculus III	
or CSCI 222	Discrete Mathematics	
MATH 266	Introduction to Differential Equations	3
or STAT 368	Statistics	
or CSCI 366	Database Systems	
STAT 367	Probability	3
or STAT 467	Probability and Mathematical Statistics I	
Economics Electives - Select 6 credits from the following 400-level economics electives:		6
ECON 402	Economics of Entrepreneurship	
ECON 410	Econometrics (May take the opposite course as an elective from what was taken in the quant. econ. option requirements.)	
or ECON 411	Computational Economics	
ECON 440	Game Theory and Strategy (if not used as capstone)	
ECON 461	Economic Development (if not used as capstone)	
ECON 465	Labor Economics	
ECON 470	Public Economics (if not used as capstone)	
ECON 472	International Trade	
ECON 475	Health Economics (if not used as capstone)	
ECON 476	Monetary Theory and Policy	
ECON 480	Industrial Organization (if not used as capstone)	
ECON 481	Natural Resource Economics	
ECON 482	Environmental Economics	
Minor Requirement		
Minor in Computer Science, Mathematics or Statistics Required		10-14
This option requires the completion of either the computer science, mathematics or statistics minor. Approximately 10-14 credits for any of these minors remains after the completion of the option requirements. The minor must be officially declared through the Office of Registration and Records.		
Total Credits		**39-44**

Business Economics option

NOTE: Students selecting the Business Economics Option complete a Bachelor of Science degree only.

Code	Title	Credits
Business Economics Option Requirements		
ECON 410	Econometrics	3
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
CSCI 122	Visual BASIC	3
Economics Electives - Select 9 credits from the following:		9
ECON 402	Economics of Entrepreneurship	
ECON 411	Computational Economics	
ECON 440	Game Theory and Strategy (if not used as capstone)	
ECON 461	Economic Development (if not used as capstone)	
ECON 465	Labor Economics	
ECON 470	Public Economics (if not used as capstone)	
ECON 472	International Trade	
ECON 475	Health Economics (if not used as capstone)	
ECON 476	Monetary Theory and Policy	
ECON 480	Industrial Organization (if not used as capstone)	

ECON 481	Natural Resource Economics	
ECON 482	Environmental Economics	
Electives - Select 3 credits from the following:		3
BUSN 340	International Business	
BUSN 341	Global Business Environment	
ECON 472	International Trade	
FIN 440	International Finance	
MGMT 440	International Management	
MRKT 440	International Marketing	
Quantitative Tools: Select 3 credits from the following:		3
ACCT 420	Accounting Information Systems	
AGEC 339	Quantitative Methods & Decision Making	
Minor Requirement		
Minor in Business Administration, Accounting, Banking or Entrepreneurship Required		10
This option requires the completion of a minor in Business Administration, Accounting, Banking, or Entrepreneurship. Approximately 10+ credits for the minor remains after the completion of the option requirements. The minor must be officially declared through the Office of Registration and Records.		
Total Credits		**37**

PROGRAM NOTES:

- Students selecting economics must complete the courses in the Core Requirement area and the requirements outlined within one of the identified option areas listed below: 1) Standard Option 2) Quantitative Economics Option or 3) Business Economics Option.
- Students must earn a minimum 2.00 cumulative GPA in courses that satisfy the core requirement and option requirements.

Minor Requirements

Minor: Economics

Required Credits: 18

Code	Title	Credits
Required Courses		
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
ECON 341	Intermediate Microeconomics	3
or BUSN 487	Managerial Economics	
ECON 343	Intermediate Macroeconomics	3
Elective Courses		
ECON 300-400	Elective	3
ECON 400	Elective	3
Total Credits		**18**

Minor Requirements and Notes

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

Electrical Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/ece/ (http://www.ndsu.edu/ece/)
- **Credential Offered:**
  B.S.E.E.
- **Official Program Curriculum:**

catalog.ndsu.edu/undergraduate/program-curriculum/electrical-engineering/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/electrical-engineering/)

Electrical engineers create products and services for society out of materials that exist in nature using principles of science and common sense. The profession is broad, encompassing products valued by society in many technical specialties from electric power and energy utilization to our current information age.

The Program

The Bachelor of Science in Electrical Engineering program is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the commission's General Criteria and Program Criteria for Electrical, Computer, Communications, Telecommunication(s) and Similarly Named Engineering Programs. It has the largest enrollment in the Dakotas. The department faculty, many of whom have years of experience in industry and teaching, give considerable attention to the individual student. Major components of the undergraduate program are basic science and mathematics, humanities and social sciences, communication, engineering science, engineering design and ethics, and both breadth and depth in electrical and computer engineering.

Areas Of Specialization

The Electrical Engineering program is designed to reflect the broad nature of the field, and students may tailor their studies within broad parameters. Students are encouraged to develop an individual program of study in close consultation with their advisers. Examples are available to illustrate how specialization may be obtained in a number of different technical areas. Students may mix and match from the examples to suit their particular interests. Technical areas include the following:

- **Biomedical Engineering** is firmly based in engineering and the life sciences. The integration of medicine and engineering serves to provide appropriate products, tool, and techniques for research diagnosis and treatment by health care professionals. Some important products are artificial hearts, medical imaging (MRI, ultrasound, CT scans), prosthetic devices, and computer aids for diagnosis. Biomedical engineers help identify the problems and needs that can be solved using engineering technology and systems methodology to provide high-quality health care at reasonable cost.
- **Communication and Signal Processing** are closely related fields within electrical engineering. Communication is the process of transferring information from one point in time and space to another point. Signal processing involves signal representation, as well as signal design and filtering. Students with this specialization find challenging opportunities worldwide to meet the need for more convenient, inexpensive, and reliable communication and signal processing.
- **Control Engineering** deals with the design and implementation of algorithms for controlling physical systems. Examples include active suspension for cars, autopilots for aircraft, and robot motion control.
- **Electromagnetics** includes electromagnetic compatibility, fiber optics, antennas, microwave devices, radar, sonar, satellite systems, power and communication transmission lines, grounding, shielding and propagation.
- **Electronics and Microelectronics** deal with integrated circuits, VSLI, transistors, lasers, consumer electronics, defense electronics, power electronics, and electronic materials.
- **Nanotechnology** deals with the study of electric materials at the nanoscale level for applications such as solar cells and sensors.
- **Optical Engineering**, developed jointly with the Department of Physic, prepares future engineers in such areas as quantum theory; coherent/incoherent polarized/non-polarized light; geometric, physical, and Fourier optics; holography; and image processing and acquisition.
- **Power Systems** deals with generation, transmission, distribution and utilization of electric energy subject to safety, environmental and economic concerns.

Cooperative Education Program

The Cooperative Education Program allows students to alternate classroom study with a series of paid professional work experiences related to electrical engineering. These experiences increase in complexity as the student's background increases. The program provides opportunity for pre-graduation experience in the profession, exploration of several career opportunities, money for education, an enriched degree and enhanced opportunities for employment following graduation.

High School Preparation

High school students are recommended to take one unit of physics, four units of mathematics and one unit of chemistry.

The Facilities

The Electrical and Computer Engineering building is part of an eight building engineering complex. The building contains specialized laboratories and equipment. Numerous grants and donations from the National Science Foundation and private industry have provided valuable equipment. Laboratories along with department and university computer capabilities support education and research.

Career Opportunities

NDSU electrical engineering graduates are working all over the world in a variety of exciting jobs at excellent salaries. They work in research, design, sales, manufacturing, testing, installation, development and teaching. Many graduates find an engineering education provides excellent training for

fields other than engineering such as business, medicine or law. Since engineers are problem solvers, there is a constant demand for engineers to solve problems outside typical engineering fields.

Research and Graduate Study

Departmental faculty members are currently active in several areas of research including biomedical, nanotechnology, communication and signal processing, controls, electromagnetics, electronics and power engineering. Graduate studies leading to the master's and doctoral degrees are offered in the department. Further details are available in the *Graduate Bulletin.*

Selective Admission

Transfer students from international institutions must have a 3.00 GPA.

Further, the department policy is that transfer courses equivalent to ECE 173 (or CSCI 160), ECE 275, EE 206 and all required Math must have a "C" or better before enrolling in ECE courses listed in the curriculums for Junior & Senior years."

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
MATH 098[1]		3	MATH 103[1]	3
ENGL 110		3	ENGL 120	3
COMM 110		3	CHEM 121	3
GEN ED Wellness		2	GEN ED Social/Behavioral Science	3
GEN ED Social/Behavioral Science and Global Perspective		3	GEN ED Humanities/Fine Arts and Cultural Diversity	3
		14		**15**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
MATH 105[1]		3	MATH 165[1]	4
ECE 173[1]		4	PHYS 251	4
ECE 275[1]		4	ECE 111	3
MATH 129[1]		3	GEN ED Science Lab (CHEM 121, PHYS 251, or PHYS 252)	1
			Tech Elective[2]	
		14		**12**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
MATH 166[1]		4	MATH 265[1]	4
EE 206[1]		4	ECE 311	4
PHYS 252		4	ECE 320	3
ECE 351		4	ECE 321	2
GEN ED Upper Level English		3	ECE 376	4
			ECE 401	1
		19		**18**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
MATH 266[1]		3	ECE 405	3

ECE 343	4	ECE 341	3
ECE 331	4	ECE Elective	3
ENGR 327	3	ECE Elective	3
ECE 403	2	ECE Elective	3
	16		**15**

Fifth Year	
Fall	**Credits**
ECE 405	3
Tech Elective[2]	3
Tech Elective[2]	3
Tech Elective[2]	3
	12

Total Credits: 135

1

This course requires the student to earn a "C" or better, in order to take upper level ECE courses.

2

Choose from the approved Tech Elective List

Sample Program Guide

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First Year			
Fall	**Credits**	**Spring**	**Credits**
MATH 103[1]	3	MATH 105[1]	3
ENGL 110	3	ENGL 120	3
COMM 110	3	ECE 173[1]	4
CHEM 121	3	GEN ED Social/Behavioral Science	3
GEN ED Wellness	2	ECE 111	3
	14		**16**

Second Year			
Fall	**Credits**	**Spring**	**Credits**
MATH 165[1]	4	MATH 166[1]	4
MATH 129[1]	3	EE 206[1]	4
ECE 275[1]	4	PHYS 251	4
GEN ED Humanities/Fine Arts and Cultural Diversity	3	GEN ED Science Lab (CHEM 121L, PHYS 251L or PHYS 252L)	1
GEN ED Social/Behavioral Science and Global Perspective	3	Tech Elective[2]	3
	17		**16**

Third Year			
Fall	**Credits**	**Spring**	**Credits**
MATH 265[1]	4	ECE 401	1
PHYS 252	4	MATH 266[1]	3
ECE 311	4	ECE 320	3

GEN ED Upper Level English		3	ECE 351		4
Tech Elective[2]		3	ECE 321		2
			ECE 376		4
		18			**17**
Fourth Year					
Fall	**Credits**		**Spring**	**Credits**	
ECE 403		2	ECE 405		3
ECE 343		4	ECE 341		3
ECE 331		4	Tech Elective[2]		3
ENGR 327		3	ECE Elective		3
Tech Elective[2]		3	ECE Elective		3
			ECE Elective		3
		16			**18**

Total Credits: 132

1

This requires the student to earn a "C" or better, in order to take upper level ECE courses.

2

Choose from the approved Tech Elective List

Sample Program Guide

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First Year					
Fall	**Credits**		**Spring**	**Credits**	
MATH 105[1]		3	MATH 165[1]		4
CHEM 121		3	MATH 129[1]		3
ENGL 110		3	ECE 111		3
COMM 110		3	ECE 173[1]		4
GEN ED Wellness		2	ENGL 120		3
GEN ED Social/Behavioral Sciences		3			
		17			**17**
Second Year					
Fall	**Credits**		**Spring**	**Credits**	
MATH 166[1]		4	MATH 265[1]		4
PHYS 251		4	EE 206[1]		4
ECE 275[1]		4	PHYS 252		4
GEN ED Social/Behavioral Sciences and Global Perspective		3	Tech Elective[2]		3
GEN ED Humanities/Fine Arts Cultural Diversity		3	GEN ED Science Lab (CHEM 121L, PHYS 251L or PHYS 252L)		3
		18			**18**
Third Year					
Fall	**Credits**		**Spring**	**Credits**	
MATH 266[1]		3	ECE 401		1

ECE 311	4	ECE 343	4
ECE 320	3	ECE 331	4
ECE 321	2	ECE 351	4
ECE 376	4	ECE Elective	3
	16		**16**

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
ECE 403	2	ECE 405	3
ECE 341	3	ECE 341	3
GEN ED Upper Level English	3	ECE Elective	3
ENGR 327	3	Tech Elective[2]	3
Tech Elective[2]	3	Tech Elective[2]	3
ECE Elective	3		
	17		**15**

Total Credits: 134

1

This course requires the student to earn a "C" or better, in order to take upper level ECE courses.

2

Choose from the approved Tech Elective List.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
MATH 165[1]	4	ECE 111[1]	3
CHEM 121	3	ENGL 120	3
GEN ED Wellness	2	MATH 129[1]	3
ECE 173[1]	4	MATH 166[1]	4
ENGL 110	3	PHYS 251	4
	16		**17**

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
EE 206[1]	4	COMM 110	3
MATH 265[1]	4	ECE 311	4
PHYS 252	4	MATH 266[1]	3
ECE 275[1]	4	Tech Elective[2]	3
GEN ED Science Lab (CHEM 121L, PHYS 251L or PHYS 252L	1	GEN ED Humanities/Fine Arts and Cultural Diversity	3
	17		**16**

Junior			
Fall	**Credits**	**Spring**	**Credits**
ECE 320	3	ECE 401	1

ECE 321	2	ECE 341	3
ECE 376	4	ECE 331	4
ECE 351	4	Tech Elective[2]	3
GEN ED ENGL/Upper Level Writing[3]	3	ECE 343	4
	16		**15**

Senior

Fall	Credits	Spring	Credits
ECE 403	2	ECE 405	3
ENGR 327 (FULFILLS HUMANITIES & FINE ARTS (A)	3	ECE Elective	3
ECE Elective	3	ECE Elective	3
Tech Elective[2]	3	Tech Elective[2]	3
GEN ED Social/Behavioral Sciences and Global Perspective	3	GEN ED Social & Behavioral Sciences	3
	14		**15**

Total Credits: 126

1

This course requires the student to earn a "C" or better, in order to take upper level ECE courses.

2

Choose from the approve Tech Elective List

3

Choose from ENGL 320, 321, 324 or 459

Electrical Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/ece/ (http://www.ndsu.edu/ece/)
- **Credential Offered:**
  B.S.E.E.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/electrical-engineering/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/electrical-engineering/#planofstudytext)

Major Requirements

Major: Electrical Engineering

Degree Type: B.S.E.E.
Minimum Degree Credits to Graduate: 126

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Electrical Engineering Core Requirements [1]		
ECE 111	Introduction to Electrical and Computer Engineering	3
ECE 173	Introduction to Computing [2]	4
ECE 275	Digital Design [2]	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]	3
MATH 165	Calculus I (May satisfy general education category R) [2]	4
MATH 166	Calculus II [2]	4
MATH 265	Calculus III (w/ vectors) [2]	4
MATH 266	Introduction to Differential Equations [2]	3
Other Courses Required		
CHEM 121	General Chemistry I (May satisfy general education category S)	3
EE 206	Circuit Analysis I [2]	4
ENGR 327	Ethics, Engineering, and Technology	3
PHYS 251	University Physics I (May satisfy general education category S)	4

PHYS 252	University Physics II (May satisfy general education category S)	4
Select one of the following: (May satisfy general education category C)		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Select one of the following lab courses (May satisfy general education category S):		1
CHEM 121L	General Chemistry I Laboratory	
PHYS 251L	University Physics I Laboratory	
PHYS 252L	University Physics II Laboratory	
ECE Electives		
Select 9 credits of ECE 4XX level prefix electives. Includes the cross listed courses of ECE 427/IME 427; ECE 429/IME 429; ECE 411/PHYS 411; & ECE 411L/PHYS 411L (excluding 494 and 496).		9
Tech Electives		
Select 12 credits from the following:		12
ABEN 456	Biobased Energy	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	
BIOL 315 & 315L	Genetics and Genetics Laboratory	
CE 309 & CE 310	Fluid Mechanics and Fluid Mechanics Laboratory	
CE/ME 486	Nanotechnology and Nanomaterials	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	
CHEM 364	Physical Chemistry I	
CHEM 365 & CHEM 471	Physical Chemistry II and Physical Chemistry Laboratory	
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory	
CSCI 161	Computer Science II	
CSCI 222	Discrete Mathematics	
CSCI 336	Theoretical Computer Science	
CSCI 366	Database Systems	
CSCI 372	Comparative Programming Languages	
CSCI 426	Introduction to Artificial Intelligence	
CSCI 459	Foundations of Computer Networks	
CSCI 467	Algorithm Analysis	
CSCI 474	Operating Systems Concepts	
CSCI 477	Object-Oriented Systems	
ECE 374	Computer Organization	
ECE 494	Individual Study (max. of 6 cr.)	
ECE 4XX	Any ECE 400 level didactic course	
ECE 496	Field Experience (max. of 3 cr.)	
ENGR 310	Entrepreneurship for Engineers and Scientists	
IME 440	Engineering Economy	

IME 456	Program and Project Management
IME 461	Quality Assurance and Control
MATH 270	Introduction to Abstract Mathematics
MATH 420	Abstract Algebra I
MATH 421	Abstract Algebra II
MATH 429	Topics in Linear Algebra
MATH 450	Real Analysis I
MATH 452	Complex Analysis
MATH 480	Applied Differential Equations
MATH 481	Fourier Analysis
MATH 483	Partial Differential Equations
MATH 488	Numerical Analysis
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
Total Credits	**106**

1

Students must complete all of the courses listed in the Electrical Engineering Core Requirements section with a 2.00 GPA.

2

No grade less than a 'C' is accepted in these courses and before enrolling in ECE 3XX level prefix courses, excluding ECE 311.

Degree Requirements and Notes

- For students interested in pursuing one of the areas of specialization, lists of recommendations for specific electives are available from the ECE Department (https://www.ndsu.edu/ece/).

Electrical Engineering and Physics

Department Information

- **Department Web Site:**
  www.ndsu.edu/ece/ (http://www.ndsu.edu/ece/)
- **Credential Offered:**
  B.S.E.E.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/electrical-engineering-physics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/electrical-engineering-physics/)

This dual major option will appeal to students with broad interests in both fundamental physics science and applied engineering methods. Graduates, equipped with analytical problem-solving skills and technical knowledge, will be well prepared to pursue careers in a wide range of fields within industry, government, and higher education. Students will earn one degree, a Bachelor of Science in Electrical Engineering (B.S.E.E.) degree, with a major in electrical engineering and physics.

Sample Program Guide

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but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	ECE 111	3
ENGL 110	3	ENGL 120	3
PHYS 171[1]	1	MATH 129[1]	3
ECE 173[1]	4	MATH 166[1]	4
MATH 165[1]	4	PHYS 251 & 251L[1]	5
Gen Ed Wellness	2		
	17		**18**
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
EE 206[1]	4	PHYS 370[1]	3
MATH 265[1]	4	ECE 311	4
ECE 275[1]	4	MATH 266[1]	3
PHYS 252 & 252L[1]	5	PHYS 350[1]	3
		Gen Ed Humanities/Fine Arts and Cultural Diversity	3
	17		**16**
Junior			
Fall	**Credits**	**Spring**	**Credits**
ECE 320	3	ECE 331	4
ECE 321	2	ECE 343	4
PHYS 355[1]	3	ECE 351	4
PHYS 360[1]	3	ECE 376	4
PHYS 462[1]	3	ECE 401	1
ENGL 320, 321, 324, or 459	3		
	17		**17**
Senior			
Fall	**Credits**	**Spring**	**Credits**
ECE 341	3	ECE 405	3
ECE 403	2	ECE Elective	3
ENGR 327	3	ECE Elective	3
PHYS 485[1]	3	Gen Ed Social & Behavioral Sciences and Global Perspectives	3
PHYS Elective (PHYS 215, 481, 486 or 489)[1]	3	Gen Ed Social & Behavioral Sciences	3
ECE/PHYS Elective (PHYS 411/L, PHYS 413, or PHYS 415)[1]	3		
	17		**15**

Total Credits: 134

1

Grade of C or higher required.

Electrical Engineering & Physics

Department Information

- **Department Web Site:**
  www.ndsu.edu/ece/ (http://www.ndsu.edu/ece/)
- **Credential Offered:**
  B.S.E.E.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/electrical-engineering-physics/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/electrical-engineering-physics/#planofstudytext)

Major Requirements

Double Major: Electrical Engineering & Physics

Degree Type: B.S.E.E.
Minimum Degree Credits to Graduate: 135

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

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

*

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Electrical Engineering Core Requirements [1]		
ECE 111	Introduction to Electrical and Computer Engineering	3
ECE 173	Introduction to Computing [2]	4
ECE 275	Digital Design [2]	4
ECE 311	Circuit Analysis II	4
ECE 320	Electronics I	3
ECE 321	Electronics II	2
ECE 331	Energy Conversion	4
ECE 341	Random Processes	3
ECE 343	Signals & Systems	4
ECE 351	Applied Electromagnetics	4
ECE 376	Embedded Systems	4
ECE 401	Design I	1
ECE 403	Design II	2
ECE 405	Design III	3
ECE Electives		
Select 6 credits of ECE 4XX level prefix electives (excluding 494 & 496).		6
Physics Core Requirements		
PHYS 171	Introductory Projects in Physics [2]	1
PHYS 251	University Physics I [2]	4
PHYS 251L	University Physics I Laboratory [2]	1
PHYS 252	University Physics II [2]	4
PHYS 252L	University Physics II Laboratory [2]	1
PHYS 350	Modern Physics [2]	3
PHYS 355	[2]	
PHYS 360	Modern Physics II [2]	3
PHYS 370	Introduction to Computational Physics [2]	3
PHYS 462	Thermal and Statistical Physics [2]	3
PHYS 485	Quantum Mechanics I [2]	3
Select one from the following: [2]		3-4
PHYS 411 & 411L	Optics for Scientists & Engineers and Optics for Scientists and Engineers Lab (or ECE 411 & ECE 411L))	
PHYS 413	Lasers for Scientists and Engineers	
PHYS 415	Elements of Photonics	
Physics Electives: Select one from the following [2]		3
PHYS 215	Research For Undergraduates (2 credit minimum)	
PHYS 481	Materials Physics	
PHYS 486	Quantum Mechanics II	
PHYS 489	Senior Project II	
MSUM Astronomy Courses (AST 300-400 level - with dept. permission)		
Mathematics Courses Required		
MATH 129	Basic Linear Algebra [2]	3
MATH 165	Calculus I [2]	4
MATH 166	Calculus II [2]	4
MATH 265	Calculus III [2]	4
MATH 266	Introduction to Differential Equations [2]	3

Other Required Courses		
EE 206	Circuit Analysis I [2]	4
ENGR 327	Ethics, Engineering, and Technology	3
Select one upper division writing course from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Total Credits		**111-112**

1

Students must complete all of the courses listed in the Electrical Engineering Core Requirements section with a 2.00 GPA.

2

No grade less than a 'C' is accepted in these course and before enrolling in ECE 3XX level prefix courses, excluding ECE 311.

Elementary Education & Human Development and Family Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/hdfs/ (http://www.ndsu.edu/hdfs/)
- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/elementary-education-human-development-family-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/elementary-education-human-development-family-science/)

The human development and family science/elementary education dual degree program is designed to provide additional knowledge in all aspects of child development to prepare elementary teachers to be advocates for young children and extend their knowledge about how children learn, what they learn, and the techniques that facilitate such learning.

The Program

Through this curriculum, students are concurrently enrolled in the human development and family science (HDFS) major (child development option) through North Dakota State University and the elementary education major through Valley City State University (VCSU). The culmination of these requirements leads to a bachelor's degree from NDSU (human development and family science major/child development option) as well as a bachelor's degree from VCSU (elementary education major).

Under a cooperative agreement, students remain on the NDSU campus to complete all coursework for the dual degree. The courses specific to the elementary education major (VCSU) are offered on the NDSU campus or in nearby elementary schools by VCSU faculty. Students are certified to teach elementary education in public schools and may, with additional course work and an additional student teaching experience, be certified to teach kindergarten as well.

The HDFS degree complements and strengthens the elementary education curriculum with coursework in child development, family issues and cultural diversity.

Children are very diverse in all aspects of their development—physical, cognitive, social and emotional. It is more accurate to view "normal" development as a range of possible outcomes rather than a single life course. Ultimately, these developmental factors have a strong influence on children's performance and behavior in school. A degree in HDFS will help future teachers understand development and its diversity, making them more effective teachers and helping them work with children from a wide variety of backgrounds.

Selective Admission

Admission to the dual degree program consists of two separate university applications:

1. Application for admission to NDSU for the human development and family science/elementary education dual degree prior to beginning the program, and
2. Application for admission to VCSU and admission to the teacher education program, which occurs at the end of the sophomore year.

During or immediately following the introductory professional education course, students must meet additional requirements to be admitted into teacher education:

1. Sophomore standing or better with a minimum cumulative grade point average of 2.75,
2. Satisfactory academic performance in English 110 and 120 (grades of C or higher) and successful completion of a speech screening test,
3. Achievement of minimum scores on the Pre-Professional Skills Test (PPST), and
4. Qualification for teacher certification in the state of North Dakota upon VCSU program completion, as outlined in the latest issue of the Educator's Professional Certificate Regulation booklet published by the North Dakota Department of Public Instruction.

Student Teaching

Student teaching is the culmination of the teaching program. Students have the opportunity to apply skills acquired in college courses under the supervision of an experienced educator.

Certification

Upon completing this program, students are eligible for certification to teach grades 1 through 8. The program is accredited by the National Council for Accreditation of Teacher Education.

Additional Certifications and Endorsements

With some additional courses, students may complete any of the following certifications, endorsements, or minors: Coaching, English Language Learner, Kindergarten, Library Media and Information Science, Middle Level Education, Reading, Minnesota Licensure, Special Education Strategist, and STEM.

Financial Aid and Scholarships

The Office of Financial Aid and Scholarships (https://www.ndsu.edu/onestop/financial-aid-and-scholarships/) at NDSU makes available grants, loans, scholarships and work-study employment. Scholarships also are available through the College of Health and Human Sciences.

The Facilities

Facilities for the dual degree program are housed in Evelyn Morrow Lebedeff Hall and the Family Life Center. Included in these buildings are classrooms, conference rooms and a child development center serving young children and their families.

Extra-Curricular Opportunities

Students may enhance their involvement by participating in groups such as the HDFS Club, the Elementary Education Club, the North Dakota Association for the Education of Young Children, the North Dakota Family and Consumer Sciences Association and the North Dakota Education Association.

Community Setting

The Fargo-Moorhead metropolitan area offers a conducive setting for study. Students have the opportunity to work in a number of community institutions serving children and families.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
PSYC 111	3	ENGL 120	3
HDFS 230	3	MATH 104	3
ENGL 110	3	GEOL 105 or 106**	3
COMM 110	3	HDFS 250	3
Science & Tech Gen Ed (BIOL)**	3	HDFS 242	3
Science lab co-requisite***	1		
	16		**15**

Sophomore							
Fall	**Credits**		**Spring**	**Credits**		**Summer**	**Credits**
HDFS 275		3	HDFS 330		3	EDUC 210: Creative Activities	2
Science: see curr guide (CHEM/PHYS/STEM ED 160)		3	HDFS 353		3		
HIST 103 or 104		3	EDUC 240 Exceptional Students		3		
Humanities & Fine Arts Gen Ed		3	EDUC 250: Introduction to Education		3		
HDFS Elective		3	EDUC 277: Math for Elem 1		3		
		15			**15**		**2**
Junior							
Fall	**Credits**		**Spring**	**Credits**			
HDFS 300-400 level elective		3	HDFS 390		1		
HDFS 300-400 level elective		3	EDUC 320: Social Studies Methods		3		
EDUC 300 Educ. Technology		2	EDUC 321: Foundation of Reading		3		
EDUC 283: Understanding Cult. Diversity		3	EDUC 322: Language Arts Methods		3		
EDUC 352: Culturally Diverse Practicum		1	EDUC 330: Children's Literature		3		
EDUC 278: Math for Elem 2		3	EDUC 400 Educational Psychology		2		
GEOG 111		3	EDUC 450: Assessment & Education Issues		2		
		18			**17**		
Senior							
Fall	**Credits**		**Spring**	**Credits**			
ENGL 320, 325, 358, or 459		3	HDFS 496*		1		
EDUC 315: Math Methods		3	EDUC 490: Student Teaching		10		
EDUC 323: Reading Methods		3					
EDUC 350: Elementary Education Practicum		2					
EDUC 355: Science Methods		3					
EDUC 491 Capstone Portfolio		1					
		15			**11**		

Total Credits: 124

*

Students should NOT enroll themselves in HDFS 496 via Campus Connection. The NDSU Registration and Records office automatically enrolls students in the course during the student's teaching semester.

**

BIOL 124 and GEOL 106 are two options for Global Perspectives, required for General Education

***

The lab credit must be in biology or earth science (including geology).

Elementary Education & Human Development and Family Science Dual Degree Program

Department Information

- **Department Web Site:**
  www.ndsu.edu/hdfs/ (http://www.ndsu.edu/hdfs/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/elementary-education-human-development-family-science/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/elementary-education-human-development-family-science/#planofstudytext)

Major Requirements

Dual Degree Program
Major at NDSU: Human Development & Family Science
Major at VCSU: Elementary Education

Degree Type at NDSU: B.A. or B.S.
Minimum Degree Credits to Graduate: 126

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
HDFS & Elementary Education Requirements		
HDFS 230	Life Span Development	3
or PSYC 250	Developmental Psychology	
HDFS 242	Couples, Marriages and Families	3
HDFS 250	Introduction to Research Methods in Human Development and Family Sciences	3
HDFS 275	Diversity and Multiculturalism in Individual and Family Life	3
HDFS 330	Child Development	3
HDFS 353	Children, Families and Public Policy	3
HDFS 390	Career Development	1
EDUC 210	Creative Activities	2
EDUC 240	Educating Exceptional Students	3
EDUC 250	Introduction to Education	3
EDUC 277	Math for Elementary Teachers I	3
EDUC 278	Math for Elementary Teachers II	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	3
EDUC 330	Children's Literature	3
EDUC 350	Elementary School Practicum and Classroom Management [1]	2
EDUC 352	Culturally Diverse Practicum	1
EDUC 355	Science Methods/Elementary Teachers	3
EDUC 400	Educational Psychology	2
EDUC 450	Trends in Assessment & Education Issues	2
EDUC 490	Student Teaching (Elementary - 10 cr.) & HDFS 496: Field Experience (1 cr.)	11
EDUC 491	Seminar (Senior Portfolio)	1
GEOL 105	Physical Geology	3
or GEOL 106	The Earth Through Time	
HIST 103	U.S. to 1877	3
or HIST 104	U.S. Since 1877	
MATH 104	Finite Mathematics	3
or STAT 330	Introductory Statistics	
PSYC 111	Introduction to Psychology	3
Select one from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
HDFS Electives: (Cannot take HDFS 230 or HDFS 496)		
HDFS	Elective	3
HDFS	300-400 level	6
Other Elementary Education Requirements		
Biology Elective		3

Chemistry or Physics Elective or STEM ED 160		3
Biology or Earth Science (Geology) Lab		1
GEOG 111	Survey of Geography	3
Total Credits		**112**

1

If no other NDSU courses are being taken during the same semester as EDUC 350, then students must enroll in an NDSU HDFS 496 course (1 cr.) in that semester. HDFS 496 can only be taken for a total of 2 credits for the entire program.

NDSU HDFS Degree Requirements and Notes

- A grade of C or better is required for all HDFS courses, regardless of whether they are used for the major core, major electives, general education, or free electives.
- A 2.50 cumulative GPA is required in major courses for graduation.
- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

VCSU Elementary Education Degree Requirements and Notes

- Though not required, many majors pursue a Reading or STEM credential or an endorsement in Kindergarten, Middle School, English Language Learners (ELL), or as a Special Education Strategist.
- A 2.75 cumulative GPA is required for admission to teacher education.
- A 2.5 cumulative GPA is required to begin coursework in elementary education program.
- Students will need to take Praxis CORE I sophomore year and Praxis II subject matter and pedagogy exams senior year .

Emergency Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/emgt/ (http://www.ndsu.edu/emgt/)
- **Credential Offered:**
  B.S.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/emergency-management/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/emergency-management/)

Our active pedagogy provides the theoretical and practical knowledge essential to the effective practice of emergency management in the public, private and non-profit sectors and the opportunity to apply that knowledge through discussion, activity, and service learning projects. You will be engaged, learn, and have a sense of belonging, and experience these things while focused on an important topic! Emergency management is “a managerial function charged with creating the framework within which communities reduce vulnerabilities to hazards and cope with disasters. Emergency management protects communities by coordinating and integrating all activities necessary to build, sustain, and improve the capability to mitigate against, prepare for, respond to, and recover from threatened or actual natural disasters, acts of terrorism, or other man-made disasters” (Principles of Emergency Management, 2007).

The Program

The major prepares students for success as practitioners in emergency management as well as related fields. The rigor of the major also prepares students for graduate work. The major is ideally-suited for students seeking emergency management as a career of first choice. Student career success is built upon the following four program attributes:

1. Provide an educational foundation that supports graduates’ entry into different settings where emergency management is practiced (e.g., government at all levels; businesses; schools and colleges; healthcare industry; non-profit organizations; humanitarian efforts; etc.);
2. Support effective practice by providing an evidence-based focus on the research and science critical to the field;
3. Promote and foster experiential opportunities through focused class activities and required internships;
4. Develop skills necessary to the effective practice of emergency management (e.g., communication; collaboration; teamwork; leadership; critical thinking; problem-solving, etc.).

The Faculty

Faculty members possess broad-based expertise in emergency management, as well as specialized expertise in their areas of practice and scholarly activity. The diversity in faculty interests, experience and expertise create a rich environment for students to learn, build relationships, and be mentored.

Curriculum Planning

Beyond the major, students are encouraged to plan a curriculum that leverages both general education coursework and requirements to complete a minor to advance their career interests and goals. Our faculty advisors are eager to meet with students to help them develop those plans. The Department also provides an orientation guide with a list of recommended general education courses that are complimentary to the major to support student choices and other guidance to support curriculum planning.

Transfer Students

Transfer students who have completed an Associates of Arts (AA), or an Associates of Science (AS), or an Associates of Applied Sciences (AAS) degree, the minor requirements for the Bachelor of Science degree will be waived. These two instances of transfer could save a student 16-24 credits or 5 to 8 classes. In addition, the department also values the service of our military men and women, and as of Fall 2020, current and former military men and women can save up to a semester when pursuing an undergraduate degree in emergency management. If NDSU's Office of Registration and Records recognizes 15 or more credits of your military training as transferable, students do not have to complete the Bachelor of Science minor requirement.

Internship Program

A six-credit internship is required for the major. Internships are typically completed in a student's junior or senior year. The internship experience allows students to combine theoretical and applied aspects of emergency management. Internships are designed to meet each student's career goals. As such, internship opportunities are as varied as students' career goals and can include working in a variety of local, national or international settings. Internships are essential for student development and are a key factor in successful job placement.

Career Opportunities

An emergency management degree prepares students for career opportunities across all sectors, all industries and all locations. The emergency management function, while structured in a variety of ways in different government, private sector, and non-profit organizations, plays an essential role in maintaining safe and secure operations that protect the entity's interests. Career opportunities in emergency management exist at all levels of government, across all government agencies, in all developing countries; private sector companies as both a site-based and corporate function; public schools and higher education institutions; hospital and healthcare facilities; non-profit organizations as part of a primary disaster mission or general operational mission; critical infrastructure industries; museums, malls, stadiums, and event centers; and other organizations or entities that manage facilities or services subject to hazards or operational interruptions that can result in harm to individuals, property or the organization.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	3	ENGL 120	3
DREM 101	3	DREM 220	3
Gen Ed Social & Behavioral Sci	3	Gen Ed Science & Tech w/ Lab	4
Gen Ed Quantitative Reasoning	3	Gen Ed Wellness	2
Free Elective	3	Free Elective	3
	15		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	DREM 345	3
DREM 222	3	DREM 381	3
Gen Ed Science & Tech	3	Gen Ed Social & Behavioral Sci/ Cultural Diversity	3
Gen Ed Hum & FA	3	DREM Major Elective	3
Free Elective	3	Free Elective	3
	15		**15**

Third Year				
Fall	**Credits**		**Spring**	**Credits**
DREM 410		3	DREM 431	3
DREM 413		3	DREM 451	3
Gen Ed Upper Division Writing		3	Gen Ed Hum/FA and Glob Perspectives	3
Gen Ed Science & Tech		3	Free Electives	6
Free Elective		3		
		15		**15**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
DREM 483		3	DREM Major Elective	3
DREM 496		6	DREM Major Elective	3
Gen Ed Social Beh Sci		3	Free Electives	9
Free Elective		3		
		15		**15**

Total Credits: 120

Emergency Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/emgt/ (http://www.ndsu.edu/emgt/)
- **Credential Offered:**
  B.S.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/emergency-management/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/emergency-management/#planofstudytext)

Major Requirements

Major: Emergency Management

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

All courses required for this major must be earned with a grade of C or higher.

Code	Title	Credits
Core Requirements:		
DREM 101	Emergencies, Disasters, and Catastrophes	3
DREM 220	Technology, Tools, and Assessments in Disaster	3
DREM 222	Career and Professional Development	3
DREM 345	Understanding Vulnerable Populations in Disasters	3
DREM 381	Disasters Through A Systems Lens	3
DREM 410	Comprehensive Emergency Management Planning	3
DREM 413	Disaster Mitigation	3
DREM 431	Disaster Response	3
DREM 451	Disaster Preparedness	3
DREM 483	Disaster Recovery	3
DREM 496	Field Experience	6
Select 3 courses from the following:		9
DREM 150	Dealing with Terrorism, Cybersecurity and Other Emerging Threats	
DREM 325	World Disasters	
DREM 435	Issues in Homeland Security and Emergency Management	
DREM 461	Business Continuity and Crisis Management	
DREM 463	Voluntary Agency Disaster Services	
DREM 491	Seminar	
Total Credits		**45**

Recommended minors: Business Administration, Communication, Community Development, Criminal Justice, Environmental Science, Food Safety, Geography, Logistics Management, Political Science, Psychology, or Sociology.

Minor Requirements

Minor: Emergency Management

Minimum Required Credits: 18

Students select one option to complete this minor.

Option One: Comprehensive Emergency Management

Code	Title	Credits
Emergency Management Core		
EMGT 101		
EMGT 361		3
EMGT 362		3
EMGT 363		3
EMGT 364		3
EMGT 281		3
Total Credits		**15**

Option Two: Homeland security

Code	Title	Credits
Emergency Management Core		
EMGT 101		
EMGT 150		
EMGT 435		
Emergency Management Elective: Select one from the following		**3**
EMGT 425		
EMGT 361		
EMGT 363		
Expanded Electives: Select two from the following *		**6**
CJ 315	Federal Law Enforcement and Crime Policy	
COMM 434		
COMM 485	Risk and Crisis Communication	
EMGT 361		
EMGT 363		
EMGT 425		
POLS 120	Terrorism	
POLS 220	International Politics	
POLS 225	Comparative Politics	
Total Credits		**9**

*

Cannot count an EMGT elective core course taken toward the required 6 elective credits in this category.

Option Three: Risk and Resilience Management

Code	Title	Credits
Emergency Management Core		
EMGT 101		
EMGT 362		3
EMGT 364		3
Emergency Management Elective: Select one from the following		**3**
EMGT 410		
EMGT 281		
Expanded Electives: Select two from the following *		**6**
COMM 484	Organizational Advocacy and Issue Management	
COMM 487	Organizational Power and Leadership	
COMM 488		
EMGT 410		
EMGT 414		

EMGT 420		
EMGT 445		
EMGT 461		
EMGT 463		
HDFS 310		
SOC 404	Community Assessment	
SOC 405	Community Development	
Total Credits		**15**

*

Cannot count an EMGT elective core course taken toward the required 6 elective credits in this category.

Option Four: Vulnerability and Capacity building

Code	Title	Credits
Emergency Management Core		
EMGT 101		
EMGT 445		
EMGT 463		
Emergency Management Electives: Select one from the following		**3**
EMGT 420		
EMGT 364		
EMGT 281		
EMGT 362		
Expanded Electives: Select two from the following *		**6**
COMM 216	Intercultural Communication	
COMM 488		
EMGT 420		
EMGT 361		
EMGT 363		
EMGT 364		
EMGT 435		
EMGT 461		
HDFS 182		
HDFS 275	Diversity and Multiculturalism in Individual and Family Life	
HDFS 310		
SOC 235	Cultural Diversity	
SOC 410	Social Inequality	
SOC 412	Sociology of Gender	
SOC 440	Sociology of Aging	
Total Credits		**9**

*

Cannot count an EMGT elective core course taken toward the required 6 elective credits in this category.

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.

English

Department Information

- **Department Web Site:**
  www.ndsu.edu/english/ (http://www.ndsu.edu/english/)
- **Credential Offered:**
  B.S.; B.A.; Minor

- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/english/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/english/)

The English studies major offers students the flexibility to follow interests in literature, linguistics, and creative, technical, and professional writing. The curriculum joins the strengths of a traditional humanities education with the career outcomes today's students seek. English majors develop strong communication skills, multiple research strategies, flexibility in responding to complex situations, and effective project-management skills. Career success is tied to the ability to understand, restate, and analyze complex ideas and texts for multiple audiences. Such success requires habits of investigation, the ability to critically analyze sources of information, and the self-assurance to handle unfamiliar materials and situations. The department offers multiple opportunities to develop these skills both in the classroom and outside the university, while working with and for authentic clients.

The Program

The English department offers a Bachelor of Arts (B.A.) and a Bachelor of Science (B.S.) in English**.** The B.A. degree requires functional proficiency in at least one language other than English, typically 14 credits of course work in that language. The flexibility of the single major in English studies means that students can emphasize course work in literature, linguistics, writing studies, or a balance of these.

The English minor has two option areas for students to pursue: literature or writing studies.

- Literature option – This option of the English minor gives students the opportunity to read widely in literature, develop analytical skills, and hone writing skills. Courses include Literary Analysis, literature survey courses, elective literature and film courses, and one writing course.
- Writing Studies option – This option of the English minor provides students with the opportunity to write creatively and professionally, and to explore emerging communication technologies. Courses include Introduction to Writing Studies, elective writing courses, and one upper-level literature or linguistics course.

Community/Student Involvement Opportunities

The Department of English offers many options for co-curricular activities that add value and dimension to English majors and minors. Students develop leadership and planning skills by taking part in English Club and the English Honor Society, Sigma Tau Delta. They practice spoken English with international students through Conversational English Circles, and they create and edit an annual literary magazine, *Northern Eclecta*. The department office suite includes a collaboration and creativity space for undergraduate students, where students can meet to study or work on projects, or share lunch and conversation with other majors. English classes often work with a range of local non-profits, and English majors are encouraged to pursue internships, co-ops, and field experiences, and regularly find opportunities in local industries, non-profits, and government offices.

Career Opportunities

Traditional careers in English studies, such as teaching, and professional and technical writing, are currently in high demand in our region, and the abilities to think critically, to synthesize information, and to write and speak with precision, clarity, and effectiveness are valuable in any career. Thus, many companies look for employees with English majors or minors. The demand for technical and professional writers has been growing, and many companies, non-profit organizations, and government agencies hire English majors. English majors also acquire project management skills and the ability to work as members of a team, which make them desirable employees. Former and current students are employed in writing intensive and/or training positions; some start their own businesses. Some English graduates seek professional degrees (law, library science, ministry, or medicine) or graduate degrees in English immediately after earning a B.A. or B.S.; some choose these options as career changes later in life.

High School Preparation

Beyond the core curriculum requirements necessary for admission to the University, students should have an English preparation that includes both frequent reading from most literary genres and extensive writing experience.

Scholarships

The Department of English awards more than $8,000 in scholarships each year and English students regularly are awarded Fulbright fellowships. Contact the department for details.

- *Hal and Alice Dickey Memorial Scholarship* – awarded to a sophomore, junior, or senior.
- *Professor Ralph Engel Scholarship* – awarded to a major who has completed at least 21 credits at North Dakota State University.
- *Marjory Archer Haggart Memorial Scholarship* – awarded biennially to a sophomore or junior.
- *G. Wilson Hunter and Phyllis Krantz Hunter Scholarship* – awarded to a sophomore, junior or senior.
- *Madeline S. Gittings Endowed Scholarship* – awarded to two or three students each year.
- *Mart and Lois Vogel Award for Excellence* – awarded to one or two upper-class students.
- *Richard L. Johnson Scholarship* – awarded to a graduate student pursuing literary studies.
- *Rooney Scholarship* – awarded to a graduate student.
- *English Faculty Award* – awarded to one or two students with 15 to 45 credits.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110		3	COMM 110	3
ENGL 167		3	Gen Ed Science & Tech	3
Gen Ed Quantitative Reasoning		3	Gen Ed Social & Behavioral Sci/Cult Div	3
Gen Ed Social & Behavioral Sci		3	ENGL 120	3
Language 101		4	Language 102	4
		16		**16**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
ENGL 272		3	ENGL 275	3
Gen Ed Science & Tech w/ Lab		4	Gen Ed Scence & Tech	3
ENGL 209, 220, 222, or 229		3	Language 202	3
Gen Ed Wellness		2	ENGL Cultural Diversity	3
Language 201		3	Free Elective	3
		15		**15**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
ENGL 251, 261, or 240		3	ENGL 252 or 262	3
ENGL Cultural Diversity		3	ENGL 300-400 level	3
ENGL 300-400 level		3	Gen Ed Upper Division Writing	3
Free Electives		4	Free Elective	6
		13		**15**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
ENGL 467		3	ENGL 400-level	3
ENGL 400-level		3	ENGL 400-level	3
Free Electives		9	Free Electives	9
		15		**15**

Total Credits: 120

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110		3	ENGL 120	3
ENGL 167		3	COMM 110	3
Gen Ed Quantitative Reasoning		3	ENGL 209, 220, 222, or 229	3
Gen Ed Social & Behavioral Sci		3	Gen Ed Science & Tech	3
Free Elective		3	Gen Ed Social & Behavioral Sci	3
		15		**15**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
ENGL 272		3	ENGL 275	3
ENGL 240, 251, or 261		3	ENGL Cultural Diversity or 300-level	3
Gen Ed Science & Tech w/ Lab		4	Gen Ed Science & Tech	3
Gen Ed Wellness		2	Minor or Free Elective	3
Free Elective		3	Free Elective	3
		15		**15**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
ENGL 251, 261, or 240		3	ENGL 252 or 262	3
ENGL Cultural Diversity		3	ENGL Cultural Diversity	3
Free Electives		9	Free Electives	9
		15		**15**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
ENGL 467		3	ENGL 300-400 level	3
ENGL 400 level		3	ENGL 300-400 level	3
ENGL 400 level		3	ENGL 400 level	3
Free Elective		6	Free Elective	6
		15		**15**

Total Credits: 120

English

Department Information

- **Department Web Site:**
  www.ndsu.edu/english/ (http://www.ndsu.edu/english/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/english/#text (http://catalog.ndsu.edu/programs-study/undergraduate/english/#text)

Major Requirements

Major: English

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

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Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major requirements

Students must earn a grade of 'C' or better in all courses used to fulfill requirements for the English major. These courses may only be repeated once.

Code	Title	Credits
Major Requirements		
ENGL 167	Introduction to English Studies	3
ENGL 272	Literary Analysis	3
ENGL 275	Introduction to Writing Studies	3
ENGL 467	English Studies Capstone Experience	3
Lower Division Elective Courses - Select one of the following:		3
ENGL 209	Introduction to Linguistics	
ENGL 220	Introduction to Literature	
ENGL 222	Introduction to Poetry	
ENGL 229	Introduction to Creative Writing	
Literature Survey Courses - Select one of the following:		3
ENGL 240	World Literature Masterpieces	
ENGL 251	British Literature I	
ENGL 261	American Literature I	

Select one of the following:		3
ENGL 252	British Literature II	
ENGL 262	American Literature II	
Cultural Diversity Courses - Select two of the following:		6
ENGL 330	Women's Writing	
ENGL 335	Multicultural Writers	
ENGL 336	Literature and The Environment	
ENGL 340	19th Century American Fiction	
ENGL 341	Contemporary American Fiction	
ENGL 345	Themes in American Culture	
ENGL 375	The Bible as Literature	
ENGL 379	Global Seminar	
ENGL 385	British Fiction	
ENGL 435	Young Adult Literature in a Multicultural World	
ENGL 453	Social and Regional Varieties of English	
ENGL 454	Language Bias	
ENGL 455	International Technical Writing	
ENGL 456	Literacy, Culture and Identity	
ENGL 474	Native American Literature	
Upper Division Elective Courses: 300-400 level courses:		
Note - AHSS 472 and AHSS 476 may be used to satisfy the 300-400 level and/or 400-level course electives below.		
ENGL	300-400 Level Courses	6
ENGL	400 Level Courses	9
Total Credits		**42**

Minor Requirements

Minor: English

literature OPTION OR WRITING OPTION

Required Credits: 21

Literature Option

Code	Title	Credits
Required Course		
ENGL 272	Literary Analysis	3
Early Period Literature Survey Course: Select one		3
ENGL 240	World Literature Masterpieces	
ENGL 251	British Literature I	
ENGL 261	American Literature I	
Later Period Literature Survey Courses: Select one		3
ENGL 252	British Literature II	
ENGL 262	American Literature II	
Minor Electives: Select 9 credits from the following:		9
200 Level Coursework (no more than 3 credits):		
ENGL 220	Introduction to Literature	
ENGL 222	Introduction to Poetry	
ENGL 225	Introduction to Film	
300 Level Coursework:		
ENGL 330	Women's Writing	
ENGL 333	Fantasy and Science Fiction	
ENGL 335	Multicultural Writers	
ENGL 336	Literature and The Environment	

ENGL 340	19th Century American Fiction	
ENGL 341	Contemporary American Fiction	
ENGL 345	Themes in American Culture	
ENGL 375	The Bible as Literature	
ENGL 376	Poetry of Rock	
ENGL 377	Modern Poetry	
ENGL 380	Shakespeare	
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 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 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**

Writing Option

Code	Title	Credits
Required Course		
ENGL 275	Introduction to Writing Studies	3
Electives: Select from the following:		15
ENGL 301	Peer Tutoring and Writing in the Disciplines	
ENGL 313	Literary Publications	
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 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 251	British Literature I	
ENGL 252	British Literature II	
ENGL 261	American Literature I	

ENGL 262	American Literature II
ENGL 330	Women's Writing
ENGL 333	Fantasy and Science Fiction
ENGL 335	Multicultural Writers
ENGL 336	Literature and The Environment
ENGL 340	19th Century American Fiction
ENGL 341	Contemporary American Fiction
ENGL 345	Themes in American Culture
ENGL 360	Grammatical Structure/English
ENGL 377	Modern Poetry
ENGL 380	Shakespeare
ENGL 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.

English Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/english-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/english-education/)

English education encompasses the four language arts of reading, writing, speaking, and listening. Accordingly, the English education major includes a broad range of English and professional education courses so that teacher candidates fully understand (a) each of the arts, (b) current theories of adolescent development, and (c) current best practices in secondary instruction. Teacher candidates also apply their knowledge and build their teaching skills during multiple clinical experiences in local schools.

The Program

Candidates in the English education major are prepared to teach language arts to students in grades 5-12 with creativity and confidence. Our curriculum comprises a variety of courses in language/linguistics, composition/rhetoric, and literature. Teacher candidates in our British, American, World, and Young Adult literature courses explore fiction, poetry, and non-fiction written by men, women, and minorities. Our professional education courses prepare teacher candidates to incorporate active learning strategies, create effective methods for assessment, and adjust instruction to accommodate multiple learning styles.

Professional Education Courses

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

Student Teaching

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

Student Advisement

An academic advisor works individually with English education majors to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to seek their advisor's help whenever needed.

LICENSURE

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

Career Opportunities

English teachers are in high demand across the country, so our graduates usually obtain full-time employment in school districts shortly after graduation. In addition to teaching careers, some English education graduates choose to teach English abroad or seek advanced degrees in English, law, library science, and counseling. Others obtain careers as corporate trainers or technical writers. Many options are available because an English education degree effectively teaches students to think critically, synthesize information, write and speak clearly and concisely, and to work effectively on teams.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	ENGL 120	3
ENGL 110	3	ENGL 240	3
Science or Technology Gen Ed	3	Quantitative Reasoning Gen Ed	3
Wellness Gen Ed	2	Social & Behavioral Science Gen Ed	3
Free Elective	3	Free Elective	3
	14		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 321	3	EDUC 322	3
ENGL 209	3	ENGL 261 or 262	3
ENGL 251 or 252	3	ENGL 360	3
ENGL 272	3	Science & Technology w/ Lab Gen Ed	4
Free Elective	3	Free Elective	3
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
Complete 20 hours of field experience at 5-12 grade level			
	15		**16**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 451	3	EDUC 475	2
ENGL 222	3	EDUC 481	3
ENGL 300/400 Literature Elective	3	EDUC 489	3
Social/Beh Science & Cultural Diversity Gen Ed	3	ENGL 380	3

Upper Division Writing Gen Ed		3	Science & Technology Gen. Ed		3
		15			**14**
Fourth Year					
Fall	**Credits**		**Spring**	**Credits**	
EDUC 482		3	EDUC 485		1
EDUC 486		3	EDUC 487		9
ENGL 435		3	EDUC 488		3
ENGL 458		3	Free Elective		3
ENGL 300/400 Literature Elective		3			
Apply for Student Teaching					
Complete PLT (grades 7-12) Exam					
Complete Subject Area Assessment Exam					
		15			**16**

Total Credits: 120

Note: If the student selects the communication option, the student must complete the additional 18 credits required. See official curriculum guide.

English Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/english-education/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/english-education/#planofstudytext)

Major Requirements

Major: English Education (Standard & Communication Options)

Degree Type: B.S. or B.A.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

English Education Major Requirements

Code	Title	Credits
Teaching Specialty Core Requirements		
ENGL 209	Introduction to Linguistics	3
ENGL 222	Introduction to Poetry	3
ENGL 240	World Literature Masterpieces	3
ENGL 272	Literary Analysis	3
ENGL 251	British Literature I	3
or ENGL 252	British Literature II	
ENGL 261	American Literature I	3
or ENGL 262	American Literature II	
ENGL 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 Core 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
Option		
Select either the Standard Option or Communication Option to complete major requirements.		14 -18
Total Credits		**84-88**

Standard Option

Code	Title	Credits
In addition to the core requirements above, the standard option requires the student to select either a modern foreign language for a B.A. degree or a minor or second major for a B.S. degree.		14 or 16+

B.A. degree requirement - A modern foreign language requires students to complete courses through the 200 level intermediate conpentency (typically 14 credits).

B.S degree requirement - Student must complete a minor or a second major (minimum 16 credits)..

Communication Option

Code	Title	Credits
In addition to the core requirements above, the communication option requires students to complete the following:		
Communication Core Courses		
COMM 112	Understanding Media and Social Change	3
COMM 200	Introduction to Media Writing	3
COMM 220	Persuasion	3
Elective Courses: Select a minimum of 9 credits from the following:		9
COMM 114	Human Communication	
COMM 150	Forensic Practice	
COMM 216	Intercultural Communication	
COMM 301	Rhetorical Traditions	
COMM 310	Advanced Media Writing	
COMM 313	Multimedia Editing	
COMM 318	Argumentation and Advocacy	
COMM 330	Photography for the Media	
COMM 375	Principles of Strategic Communication	
COMM 421	History of Journalism	
Total Credits		**18**

Degree Requirements and Notes

- A grade of 'C' or better is required in all Professional Education Requirement (EDUC) and Teaching Specialty Core Requirement (ENGL) courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.
- See School of Education (https://www.ndsu.edu/education/) for admission requirements.

Entrepreneurship

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  Minor; UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/entrepreneurship/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/entrepreneurship/)

The entrepreneurship programs at NDSU are experiential programs accessible to all NDSU students, regardless of major. Our entrepreneurship programs equip students with the skills to solve meaningful problems within their communities and careers. True to NDSU's distinctive approach to learning, our entrepreneurship programs are designed to educate and empower. The programs are powered by the Center for Entrepreneurship and Family Business in the NDSU College of Business.

The program provides many pathways so that students are able to design a program experience specific to their interests and needs. Whether the goal be new business creation, taking over a family business, social entrepreneurship, international entrepreneurship, engineering, or a rewarding career within an existing business, the NDSU entrepreneurship program has a unique path for all of these interests.

The entrepreneurship certificate program is available for students to earn in either an on-campus or an online format. The entrepreneurship minor is available for students to earn only in an on-campus format.

Entrepreneurship

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  Minor; UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/entrepreneurship/ (http://catalog.ndsu.edu/programs-study/undergraduate/entrepreneurship/)

Minor Requirements

Minor: Entrepreneurship

Required Credits: 16-18

Code	Title	Credits
Minor Core Requirements		
ENTR 201	Introduction to Entrepreneurship	3
or MGMT 470	Entrepreneurship/Small Business Management	
ENTR 301	Entrepreneurship Toolbox I	3
or ENGR 310	Entrepreneurship for Engineers and Scientists	
or ENTR 440	International Entrepreneurship	
or MGMT 471	Leading Social Entrepreneurship and Nonprofit Organizations	
or MGMT 472	Managing Family Enterprises	
or MRKT 432	Entrepreneurial Sales	
ENTR 401	Entrepreneurship Capstone [4]	3
Select one from the following:		4-6
ENTR 496	Practicum/Internship	
ADHM 496	Field Experience (Topic - Entrepreneurship)	
ENGR 481 & ENGR 482	Engineering Entrepreneurship Capstone I and Engineering Entrepreneurship Capstone II	
Elective (choose one course): [1]		3
CE 483	Contracts and Specifications	
CSCI 345	Topics on Personal Computers	
ECON 402	Economics of Entrepreneurship	
ENGR 310	Entrepreneurship for Engineers and Scientists (if not taken above)	
ENTR 301	Entrepreneurship Toolbox I (if not taken above)	
ENTR 440	International Entrepreneurship (if not taken above)	
IME 450	Systems Engineering and Management	
MGMT 451	Negotiations [2]	
MGMT 471	Leading Social Entrepreneurship and Nonprofit Organizations (if not taken above)	
MGMT 472	Managing Family Enterprises (if not taken above)	
MRKT 430	Sales and Personal Selling	
MRKT 432	Entrepreneurial Sales ((if not taken above))	
MRKT 450	Marketing Research	
MRKT 465	Digital Marketing [3]	
ME 361	Product Design and Development	
MUSC 385	Music Entrepreneurship	
Total Credits		**16-18**

1

Prerequisite(s) for the elective courses apply; refer to the course descriptions.

2

Will require instructor's permission to enroll for students without MGMT 320 prerequisite.

3

Will require instructor's permission to enroll for students without MRKT 320 prerequisite.

4

ENTR 401 must be taken at NDSU; transfer coursework will not be allowed.

Degree Note:

- Students must declare this minor to register for College of Business prefix courses.

Certificate Requirements

Certificate: Entrepreneurship

Required Credits: 9

Code	Title	Credits
ENTR 201	Introduction to Entrepreneurship	3
or MGMT 470	Entrepreneurship/Small Business Management	
ENTR 301	Entrepreneurship Toolbox I	3
or ENGR 310	Entrepreneurship for Engineers and Scientists	
or ENTR 440	International Entrepreneurship	
or MGMT 471	Leading Social Entrepreneurship and Nonprofit Organizations	
or MGMT 472	Managing Family Enterprises	
ENTR 401	Entrepreneurship Capstone	3
Total Credits		**9**

Environmental Design

Department Information

- **Department Web Site:**
  www.ndsu.edu/landscapearchitecture/ (http://www.ndsu.edu/landscapearchitecture/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/environmental-design/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/environmental-design/)

The Bachelor of Science in environmental design is direct preparation for the Master of Landscape Architecture graduate degree program. Students begin by completing a Bachelor of Science degree in environmental design. Successful performance in the coursework leads to placement in the Master of Landscape Architecture program. A successful student typically completes the undergraduate degree and the professional Master of Landscape Architecture degree in 5 years.

According to the American Society of Landscape Architects (ASLA), landscape architecture involves planning, designing, managing, and nurturing the built and natural environments. With their unique skill set, landscape architects work to improve human and environmental health in all communities. They plan and design parks, campuses, streetscapes, trails, plazas, residences, and other projects that strengthen communities.

Career Opportunities

The profession of landscape architecture is one of only 60 professions to be licensed in all 50 states and is projected to continue strong growth for the next 10-20 years. Landscape architects work for professional design firms, government agencies like the National Park Service, city planning offices, and other multi-disciplinary offices in the architecture and engineering fields. With their unique skill set, landscape architects work to improve human and environmental health in all communities.

High School Preparation

Although not required or continuously available, we suggest students take high school courses in drawing (digital and hand drawing), science, engineering, and math; geology, physics, civil engineering, drafting, and geometry, respectively. And, if possible, we encourage high school students to take advanced placement or college credit courses that fulfill NDSU General Education requirements.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
ENVD 101		3	ENVD 104	1
ENVD 102		1	ENVD 172	3
ENVD 130		3	ENGL 120	3
ARCH 321		3	COMM 110	3
ENGL 110		3	ANTH 111	3
PSYC 111 or SOC 110		3	Gen Ed Quantitative Reasoning	3
		16		**16**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
LA 231		3	LA 374	6
LA 271		6	LA 332	3
LA 321		4	Gen Ed Science & Tech	3
PLSC 355		3	Gen Ed Science & Tech	3
			Gen Ed Wellness	2
		16		**17**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
LA 341		4	LA 442	4
LA 431		3	LA 472	6
LA 471		6	ENGL 320, 326, or 357	3
Gen Ed Science & Tech with Lab		4	Free Elective	3
		17		**16**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
LA 421		3	LA 444	4
LA 475		6	LA 476	6
Free Elective		3	Free Elective	3
Free Elective		3	Free Elective	3
		15		**16**

Total Credits: 129

Environmental Design

Department Information

- **Department Web Site:**
  www.ndsu.edu/landscapearchitecture/ (http://www.ndsu.edu/landscapearchitecture/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**

catalog.ndsu.edu/programs-study/undergraduate/environmental-design/ (http://catalog.ndsu.edu/programs-study/undergraduate/environmental-design/)

Major Requirements

Major: Environmental Design

Degree Type: B.S.
Minimum Degree Credits to Graduate: 130

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
ANTH 111	Introduction to Anthropology	3
ARCH 321	History and Theory of Architecture I	3
ENVD 101	Introduction to Environmental Design	3
ENVD 102	Drawing Basics for Environmental Designers	1
ENVD 104	Environmental Design Fundamentals	1
ENVD 130	Drawing Skills for Environmental Designers	3
ENVD 172	Environmental Design Fundamentals Studio	3
LA 231	Digital Media + Methods Technology	3

LA 271	Landform + Spacemaking Design Studio	6
LA 332	Digital Drawing + Representation Technology	3
LA 321	History of Landscape Architecture	4
LA 341	Site Development and Detailing I	4
LA 374	Park + Open Space Design Studio	6
LA 442	Advanced Grading + Drainage	4
LA 421	Planting Design: Theory + Research	3
LA 431	Advanced Digital Applications + Analysis Technology	3
LA 444	Advanced Construction Drawing + Documentation	4
LA 472	Advanced Community Planning + Design Studio	6
LA 471	Site Elements + Composition Design Studio	6
LA 475	City-Shaping Design Studio	6
LA 476	Ecological Design Studio	6
PLSC 355	Woody Landscape Plants	3
PSYC 111	Introduction to Psychology	3
or SOC 110	Introduction to Sociology	
Select one from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 326	Writing in the Design Professions	
ENGL 357	Visual Culture and Language	
Total Credits		**90**

Degree Notes:

The Bachelor of Science degree with a major in environmental design is exempt from the college minor requirement and the nine credits of college area requirements. This major is intended only for students who plan to complete the Master of Landscape Architecture Degree.

Environmental Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/ccee/ (http://www.ndsu.edu/ccee/)
- **Credential Offered:**
  B.S.Env.E.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/environmental-engineering/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/environmental-engineering/)

Environmental Engineering is one of the four undergraduate degree programs in the Department of Civil, Construction and Environmental Engineering (CCEE). The vision of the department is to impact people and communities through the creation of globally relevant knowledge, innovators, and future opportunity builders. We dare to change the world: we educate students to become global leaders in our fields; we solve existing and emerging challenges of the world through innovation and research excellence; we integrate the complexities of design, management, and practice to solve societal problems and create opportunities; and we serve all people and communities in North Dakota and beyond.

Would you like to make this world a better place to live by focusing on the interactions between humans and the environment? You could make a difference by choosing a career in environmental engineering. We design sustainable solutions to societal challenges today and into the future.

THE PROGRAM

In general, environmental engineers integrate and apply biological, chemical, and engineering principles to improve and sustain the environment for the protection of its ecosystems, human health, and environmentally-related enhancement of the quality of life. The discipline focuses on water and wastewater treatment system design and public health protection; traditional and emerging contaminant mitigation in water, soil, and air; ecological principles in the design process; green manufacturing; and sustainable design. Environmental engineers will play a crucial role in numerous 21st-century challenges, including sustainably supplying food, water, and energy; designing a future without pollution and waste; creating efficient, healthy, and resilient cities; fostering informed decisions and actions; and, curbing climate change and adapting to its impacts.[1] Environmental engineers are professionals who have broad scientific and technical knowledge, possess strong problem-solving and design skills, and enjoy working with people. Our work is directly related to public and environmental health and well-being, and we have a significant impact on decision-making and planning processes. NDSU's B.S. in Environmental Engineering degree program began accepting students in fall 2020. Its graduates will be sought by

companies nationally at competitive salaries, and they will apply their skills in all fields of the profession domestically and abroad. The graduates will most certainly put their education to good use, bettering themselves and the world in which they live.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

The following program educational objectives are consistent with the university, college and department missions. Graduates of our B.S. in Environmental Engineering program are expected within a few years of graduation to:

1. Engage successfully in the practice of engineering to solve current and emerging problems.
2. Conduct design in a manner that is ethical, includes diverse perspectives and realizes the broader societal and sustainability implications of the design and decision-making process.
3. Ascend to leadership roles within the workplace via initiative and responsible stewardship.
4. Advance their profession and communities through collaborative work, professional licensure, advanced degrees, lifelong learning, and engaged service.

STUDENT OUTCOMES (SO)

The B.S. in Environmental Engineering degree program has the following student outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

CURRICULUM

First-year environmental engineering students at NDSU begin their education with fundamental courses in English, chemistry, mathematics, introduction to environmental engineering, design and analysis methods and tools, and engineering science. Second-year courses emphasize environmental engineering fundamentals, microbiological principles, fluid mechanics, graphic communications, mathematics, statistical analyses, and engineering science courses. During the third year, students gain exposure and knowledge in sustainable design, unit operations and processes, fate, and transport of pollutants, soil mechanics, environmental chemistry, ethics, water resources, physics, and three hours of technical electives. The senior year focuses on specialized courses in air pollution, solid and hazardous waste management, water and wastewater treatment and design, hydrology, a one-year capstone senior design experience, and nine hours of technical electives. The technical electives allow the student to take additional courses in those areas of environmental engineering/science in which she or he intends to practice professionally.

FACULTY

The department has well-qualified and dedicated faculty members. They are nationally and internationally recognized experts, with the knowledge and experience to prepare graduates for successful careers. All faculty members in the department have a doctoral degree. Many of them are licensed as a Professional Engineer (PE) or Certified Professional Contractor (CPC). In addition, the department has many adjunct faculty members who worked or are currently working in the industry.

FACILITIES

The department has excellent laboratory facilities for undergraduate education across all civil, environmental, and construction areas, including teaching laboratories for civil engineering materials, construction management and engineering, environmental engineering, geotechnical engineering, structural engineering, transportation engineering, and water resources engineering. Students also have access to computer clusters and many state-of-the-art research laboratories.

STUDENT ORGANIZATIONS

Students participate in many professional student organizations in the department, which helps them develop leadership and teamwork skills. The major student organizations include the American Railway Engineering and Maintenance-of-Way Association (AREMA), the American Society of Civil Engineers (ASCE), the American Water Works Association (AWWA, Associated General Contractors (AGC), the Institute of Transportation Engineers (ITE), Materials Research Society (MRS), National Association of Homebuilders (NAHB), Sigma Lambda Chi, and Water Environment Federation (WEF), as well as Steel Bridge, Concrete Canoe, Associated Schools of Construction, Residential Construction Management, GeoWall, and Quiz Bowl competition teams. Students may also participate in several student organizations within the College of Engineering, including the American Indian Science and Engineering Society (AISES), Engineers Without Borders (EWB), Grand Challenge Scholars of NDSU, Habitat for Humanity, National Society of Black Engineers (NSBE), Society of Women Engineers (SWE). The student organizations have won several national and regional awards.

PREPARATION

High school students who wish to prepare for college engineering should attempt to complete the following high school credits: one unit of physics, four units of math, and one unit of chemistry. Nationally, incoming first-year students who come prepared to enroll in calculus frequently complete their environmental engineering degree in 4 years. Students who have studied two years of pre-engineering at another institution can normally complete the environmental engineering degree in two additional years.

SCHOLARSHIPS AND FINANCIAL AID

The department awards numerous scholarships each year, which mostly range from $500 to $10,000. Students should check with the department for more information. Other forms of financial aid are available through the Office of Financial Aid and Scholarships.

CAREER OPPORTUNITIES

NDSU environmental engineering students will be highly sought for internships and co-ops, with most students having completed multiple work experiences. Graduates from the program will be widely regarded as hands-on, can-do, project-ready professionals, who will be very successful in finding excellent jobs. Most students will have selected a job before graduation and others within a few weeks of graduation. The work varies with the type of activity and location. Environmental engineers can work in the office, in the field, or a combination of the two. They can work primarily with several intricate designs or with people in management or sales. Environmental engineering graduates normally go to work at consulting firms, governmental (state and federal) agencies, nonprofits/NGOs, or industry. The academic curriculum also prepares environmental engineering graduates for graduate school, law school, and/or an MBA program.

Since this degree program began in the fall semester of 2020, job placement data are not currently available. The median pay for environmental engineers in the US is $96,530 per year (2022). The U.S. Bureau of Labor Statistics projects a 6-percent growth in employment for environmental engineers from 2022 to 2032 which is above the average growth rate for all occupations (3 percent).

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[1] National Academies of Sciences, Engineering, and Medicine. 2019. Environmental Engineering for the 21st Century: Addressing Grand Challenges. Washington, DC: The National Academies Press.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
ENVE 111		1	ENVE 112	1
CHEM 121		3	CHEM 122	3
CHEM 121L		1	CHEM 122L	1
ENGL 110		3	COMM 110	3
ENGL 120		3	MATH 166	4
MATH 165		4	ME 221	3
			Gen Ed Social & Behavioral Sciences	3
		15		**18**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
ENVE 250		3	ENVE 240	3
CE 212		3	CE 309	3
CHEM 240		3	IME 460	3
GEOL 105		3	MATH 128	1
MATH 259		3	MATH 266	3
ME 222		3	ME 223	3
			Gen Ed Wellness (W)	2
		18		**18**

Junior				
Fall	**Credits**		**Spring**	**Credits**
ENVE 360		3	ENVE 412	2
ENVE 370		3	ENVE 450	1
CE 310		1	ENVE 460	3
CE 316		3	CE 408	3
ENGL 321		3	ENGR 311	3
ENGR 327		3	PHYS 252	4
		16		**16**
Senior				
Fall	**Credits**		**Spring**	**Credits**
ENVE 488		2	ENVE 489	2
CE 410		3	ENVE 473	3
CE 472		3	Category One Technical Elective	3
CE 477		3	Category Two Technical Elective	3
IME 440		2	Gen Ed Social & Behavioral Sciences/Cultural Diversity	3
Category One Technical Elective		3		
		16		**14**

Total Credits: 131

Degree Notes:

- No grades less than a "C" are accepted in any of the math courses for this curriculum.
- Some courses have pre-requisites that must be satisfied before a student can enroll.
- Some courses require the approval of the department offering prior to enrolling.

Environmental Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/ccee/ (http://www.ndsu.edu/ccee/)
- **Credential Offered:**
  B.S.Env.E.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/environmental-engineering/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/environmental-engineering/#planofstudytext)

Major Requirements

Major: Environmental Engineering

Degree Type: B.S.Env.E.
Minimum Credits Required for Degree: 131

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.

7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Code	Title	Credits
Environmental Engineering Core Requirements		
CE 212	Civil Engineering Graphic Communications	3
CE 309	Fluid Mechanics	3
CE 310	Fluid Mechanics Laboratory	1
CE 316	Soil Mechanics	3
CE 408	Water Resources and Supply	3
CE 410	Water and Wastewater Engineering	3
CE 472	Solid and Hazardous Waste Management	3
CE 477	Applied Hydrology	3
ENVE 111	Introduction to Environmental Engineering	1
ENVE 112	Analysis and Design Methods for Environmental Engineers	1
ENVE 240	Microbiological Principles for Environmental Engineers	3
ENVE 250	Fundamentals of Environmental Engineering	3
ENVE 360	Environmental Chemistry for Water and Wastewater	3
ENVE 370	Sustainability Engineering	3
ENVE 412	Unit Operations and Processes	2
ENVE 450	Environmental Engineering Chemistry Laboratory	1
ENVE 460	Environmental Fate and Transport	3
ENVE 473	Air Pollution	3
ENVE 488	Senior Design I	2
ENVE 489	Senior Design II	2
MATH 128	Introduction to Linear Algebra [3]	1
MATH 165	Calculus I [3]	4
MATH 166	Calculus II [3]	4

MATH 259	Multivariate Calculus [3]	3
MATH 266	Introduction to Differential Equations [3]	3
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
CHEM 240	Survey of Organic Chemistry	3
ENGL 321	Writing in the Technical Professions	3
ENGR 327	Ethics, Engineering, and Technology	3
GEOL 105	Physical Geology	3
IME 440	Engineering Economy	3
IME 460	Evaluation of Engineering Data	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
PHYS 252	University Physics II	4
Technical Electives		
Students must take a total of 9 credits - a minimum of 6 credits from category one and a maximum of 3 credits from category two.		
Category One Technical Electives		6
CE 417	Slope Stability and Retaining Walls	
CE 421	Open Channel Flow	
CE 462	Designing with Geosynthetics	
CE 471	Environmental Nanotechnology	
CE 474	Groundwater Sustainability Design	
CE 476	Watershed Modeling	
CE 478	Water Quality Management	
CE 479	Advanced Water and Wastewater Treatment (Advanced Water and Wastewater Treatment)	
CE 491	Seminar (Small Community Water Supply and Sanitation)	
CE 494	Individual Study (Environmental Engineering Design)	
ENVE 468	Plastics Pollution to Solution	
Category Two Technical Electives		3
BIOL 470	[1]	
BIOL 480	Ecotoxicology [1]	
BIOL 481	Wetland Science [1]	
CE 486	Nanotechnology and Nanomaterials	
GEOG 455	Introduction to Geographic Information Systems	
GEOG 456	Advanced Geographic Information Systems [1]	
GEOG 465	Remote Sensing of the Environment	
RNG 452	Managing Natural and Rangeland Resources using GIS	
or NRM 452	Managing Natural and Rangeland Resources using GIS	
RNG 454	Wetland Resources Management [1/2]	
or NRM 454	Wetland Resources Management	
Total Credits		**112**

1

This course has a pre-requisite that may need to be satisfied.

2

This course requires the approval of the offering department prior to enrolling.

3

No grades less than a "C" are accepted in any of the math courses for this curriculum.

Equine Assisted Services

Department Information

- **Department Web Site:**
  www.ndsu.edu/agriculture/academics/academic-units/animal-sciences (http://www.ndsu.edu/agriculture/academics/academic-units/animal-sciences/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/equine-assisted-activities-therapies/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/equine-assisted-activities-therapies/)

The Equine Assisted Services minor offers students from any major who possess basic horsemanship skills an opportunity to pursue their therapeutic riding instructor or equine specialist certification. This 18-credit experiential learning program focuses on concepts and theories in the field, equine management, human development, precautions and contraindications of disabilities, and application of the skills needed to become a therapeutic riding instructor or equine specialist.

Equine Assisted Services

Department Information

- **Department Web Site:**
  www.ndsu.edu/agriculture/academics/academic-units/animal-sciences (http://www.ndsu.edu/agriculture/academics/academic-units/animal-sciences/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/equine-assisted-activites-therapies/ (http://catalog.ndsu.edu/programs-study/undergraduate/equine-assisted-activites-therapies/)

Minor Requirements

Minor: Equine Assisted Services

Required Credits: 18

Code	Title	Credits
Required Courses		
ANSC 165	Animals and Human Health	3
ANSC 260	Introduction to Equine Studies	2
ANSC 260L	Equine Care and Management Practicum	1
ANSC 261	Basic Equitation & Horsemanship	1
ANSC 265L	Principles of Equine Assisted Services Lab	2
ANSC 361	Intermediate Horsemanship	1
ANSC 365	Equine Assisted Services Practicum I	1
ANSC 465	Equine Assisted Services Practicum II	1
Electives: Select 6 credits from the following (Please note some courses below require a prerequisite that may not be listed):		**6**
HDFS 230	Life Span Development	
HDFS 320	Prenatal, Infant and Toddler Development	
HDFS 330	Child Development	
HDFS 340	Adolescent Development	
HDFS 360	Adult Development and Aging	
PSYC 211	Introduction To Behavior Modification	
PSYC 212	Psychological Aspects of Drug Use and Abuse	
PSYC 214	Social Interaction	
PSYC 250	Developmental Psychology	
PSYC 270	Abnormal Psychology	

BIOL 220	Human Anatomy and Physiology I
BIOL 221	Human Anatomy and Physiology II
First Aid & CPR Certification *	
American Heart Association or American Red Cross First Aid and CPR Certification	
Total Credits	**18**

*

Students must earn their First Aid and CPR certification and present their current cards to the department of Animal Science for verification of this certification. Once verified by the department, the department will submit a waiver form to the Office of Registration and Records as proof of certification completion.

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a 2.0 minimum GPA for the minor requirements.

Equine Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/agriculture/academics/academic-units/animal-sciences (http://www.ndsu.edu/agriculture/academics/academic-units/animal-sciences/)
- **Credential Offered:**
  B.S.; minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/equine-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/equine-science/)

Equine Science continues to grow, contributing approximately $177 billion to the U.S. economy. Careers in the U.S. horse industry support the equivalent of approximately 2.2 million jobs directly and indirectly. There are approximately 6.6 million horses in the U.S. with over 1.5 million people owning horses and an additional 39 million people identifying as horse enthusiasts.

THE PROGRAM

The Equine Science program provides a well-rounded, science-based education encompassing both classroom and experiential learning opportunities. For individuals interested in pursuing their education beyond a Bachelor of Science degree, the Equine Science curriculum can be tailored to meet the requirements for veterinary schools and graduate programs.

THE CURRICULUM

The Equine Science major is designed to provide a strong overall background with supporting course work in the sciences, humanities and general education. Program classes include anatomy, physiology, nutrition, health, production management, evaluation, horsemanship and equitation. Additionally, the curriculum requires students to complete an internship, study abroad or research experience. Experiential learning opportunities are a priority in the program with 70% of the equine courses providing students with hands-on learning. These unique experiences provide students with valuable knowledge about the equine industry both inside and outside the classroom.

An Equine Science minor allows students to explore several equine-related courses and gain general horse industry knowledge. This minor pairs well with any major offered at NDSU.

THE FACULTY

The Equine Science Program has outstanding faculty members with diverse backgrounds in the equine industry who are ready to help students learn and thrive at NDSU. Our faculty have taught internationally, earned multiple teaching and advising awards, and maintain active research programs.

Equine Science faculty expertise is complemented by other faculty within the Department of Animal Sciences and across the university. The overall quality of the faculty at North Dakota State University has been recognized through numerous awards for teaching and research excellence.

CAREER OPPORTUNITIES

Our graduates find exciting careers in diverse areas including sales representatives for nutrition, pharmaceutical and equipment products; marketing specialists; barn and facility managers; equine event and show managers; working with breed and industry associations; equine reproduction; extension educators; and riding instructors. In addition to career opportunities following graduation, many students choose to continue their education in veterinary schools or graduate programs.

EXTRA-CURRICULAR ACTIVITIES

The NDSU Horsemen's Association provides a variety of equine-related outreach activities. The club supports the Intercollegiate Horse Show teams (western and hunt seat), sponsors collegiate horse shows, and conducts several youth educational events.

The NDSU Rodeo Club provides students the opportunity to gain experience and knowledge of the sport of rodeo. The club supports the Intercollegiate Rodeo Team and hosts a variety of rodeo related events and activities for the public.

FINANCIAL AID AND SCHOLARSHIPS

Part-time work and work-study programs are available at the equine center, in several different livestock units, and in animal science laboratories within the department. Over $80,000 in departmental scholarships are awarded to Equine Science, Animal Science and Veterinary Technology students annually. In addition, the College of Agriculture, Food Systems, and Natural Resources awards scholarships each year to incoming freshman and current NDSU students. Contact the Office of the Dean, College of Agriculture, Food Systems, and Natural Resources, for more information on college scholarships https://www.ag.ndsu.edu/academics/scholarships (https://www.ag.ndsu.edu/academics/scholarships/).

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ANSC 101 or 102	1	ANSC 223	2
ANSC 218	3	BIOL 111 & BIOL 100L*	4
ANSC 260	2	COMM 110	3
ENGL 110	3	ENGL 120	3
MATH 103, 105, 107, or 146	3	Gen Ed Humanities/Fine Arts	3
Gen Ed Social/Behavioral Science and Cultural Diversity	3		
	15		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
AGEC 242	3	ECON 201	3
ANSC 260L	1	MICR 202 & 202L	3
ANSC 261	1	PLSC 315	3
CHEM 117 & 117L**	4	STAT 330	3
Gen Ed Humanities/Fine Arts	3	Free Elective	3
Free Elective	3		
	15		**15**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
ANSC 235	2	AGEC 244	3
ANSC 360	3	ANSC 364	3
ANSC 357	3	ANSC 371 or 370	3
ANSC Elective	3	ANSC 463 & 463L	4
Gen Ed Upper-Division Writing	3	BIOC 260	4
	14		**17**

Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
ANSC 393 or 396		3	ANSC 478	3
Gen Ed Wellness		2	ANSC 480	3
ANSC Elective		6	Free Elective	7
NRM/PLSC/RNG/SOIL Elective		3		
Free Elective		3		
		17		**13**

Total Credits: 121

*
BIOL 111 and 100L are recommended, but students can substitute BIOL 150 and 150L

**
CHEM 117 and 117L are recommended, but students can substitute CHEM 121 and 121L

Equine Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/agriculture/academics/academic-units/animal-sciences (http://www.ndsu.edu/agriculture/academics/academic-units/animal-sciences/)
- **Credential Offered:**
  B.S.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/equine-science/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/equine-science/#planofstudytext)

Major Requirements

Major: Equine Science

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	

Upper Division Writing †	
Category R: Quantitative Reasoning †	**3**
Category S: Science and Technology †	**10**
Category A: Humanities and Fine Arts †	**6**
Category B: Social and Behavioral Sciences †	**6**
Category W: Wellness †	**2**
Category D: Cultural Diversity *†	
Category G: Global Perspectives *†	
Total Credits	**39**

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Required Core Courses for Equine Science		
ANSC 218	Anatomy and Physiology of Domestic Animals	3
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		
ANSC 360	Equine Nutrition	3
ANSC 364	Equine Anatomy and Physiology	3
ANSC 370	Fundamentals/Animal Disease	3
or ANSC 371	Fundamentals of Animal Disease II	
ANSC 480	Equine Industry and Production Systems	3
ANSC 478	Research and Issues in Animal Agriculture	3
ANSC 393	Undergraduate Research	2
or ANSC 396	Field Experience	
ANSC 463	Physiology of Reproduction	3
ANSC 463L	Physiology of Reproduction Laboratory	1
Animal Science Electives	Select 9 credits of ANSC prefix courses	9
Select one of the following:		1
ANSC 101	Student Success Techniques - Animal and Equine Science	
ANSC 102	Student Success Techniques - Animal Sciences with Pre-Veterinary Medicine Emphasis	
ANSC 201	Student Success Techniques - Nontraditional & Transfer Students	
VETS 101	Student Success Techniques: Veterinary Technology	
Select one pair from the following:		4
BIOL 111 & BIOL 100L	Concepts of Biology and Non-Majors Biology Lab	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
Select one of the following:		3
MATH 103	College Algebra	
MATH 105	Trigonometry	
MATH 107	Precalculus	
MATH 146	Applied Calculus I	

AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
BIOC 260	Elements of Biochemistry	4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy general education category S)	4
ECON 201	Principles of Microeconomics (May satisfy general education category B)	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab (May satisfy general education category S)	3
PLSC 315	Genetics (May satisfy general education category S)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Choose from any level PLSC, NRM, or RNG		3
Total Credits		**81**

Degree Requirements and Notes:

- Students must earn at least a 2.00 GPA that is based on the courses that are used to satisfy major requirements.
- Transfer grades of 'C' or better to count towards major requirements.

Minor Requirements

Minor: Equine Science

Required Credits: 16

Minor Requirements

Code	Title	Credits
Required Courses		
ANSC 223	Introduction to Animal Nutrition	2
ANSC 260	Introduction to Equine Studies	2
ANSC 260L	Equine Care and Management Practicum	1
or ANSC 261	Basic Equitation & Horsemanship	
ANSC 360	Equine Nutrition *	3
or ANSC 364	Equine Anatomy and Physiology	
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	Animal Genetics	
ANSC 360	Equine Nutrition *	
ANSC 361	Intermediate Horsemanship	
ANSC 362	Colts in Training	
ANSC 364	Equine Anatomy and Physiology *	
ANSC 371	Fundamentals of Animal Disease II	
ANSC 461	Advanced Horsemanship and Equitation	
ANSC 463	Physiology of Reproduction	
ANSC 480	Equine Industry and Production Systems	
ANSC 496	Field Experience	

*

If both courses are completed successfully, the second course will apply towards Elective Courses category.

Minor Requirements and Notes:

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

Event Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  UG Certificate
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/event-management/ (http://catalog.ndsu.edu/programs-study/undergraduate/event-management/)

The Event Management Certificate Program offers students a high-quality, hands-on educational experience to prepare them for a career in the event and meeting industry. It equips students with the knowledge and experience needed to successfully plan, budget, market, and implement conventions, meetings, and special events.

Event Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/event-management/ (http://catalog.ndsu.edu/programs-study/undergraduate/event-management/)

Certificate Requirements

Certificate: Event Management

Required Credits: 12

Code	Title	Credits
MGMT 141	Travel Management	3
MGMT 241	Event Management	3
MGMT 320	Foundations of Management	3
MGMT 441	Events Experience and Planning	3
Total Credits		**12**

Exercise Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/hnes/ (http://www.ndsu.edu/hnes/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/exercise-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/exercise-science/)

Large corporations, hospitals, colleges, small businesses, resorts and hotels are incorporating more health promotion services than ever before. The exercise science (ES) major at North Dakota State University prepares students to meet this growing demand. The exercise science major is accredited by the Commission on Accreditation of Allied Health Education Programs adopted by the American College of Sports Medicine (ACSM). This curriculum covers the knowledge, skills and abilities expected of an ACSM Certified Exercise Physiologist.

Exercise Science Major Overview

The ES major is designed to prepare students for entry-level positions in any of the four health-fitness settings: commercial, community, corporate or clinical. Completion of the ES major may act as a stepping stone to prepare the exceptional student for graduate education in exercise physiology/science, cardiac rehabilitation, physical therapy, occupational therapy, sports medicine, biomechanics or other allied health disciplines.

The ES major includes everything from the study of physical activity and the associated acute and chronic physiological responses and adaptations resulting from it, to health-fitness business management principles found in facilities worldwide. Students are strongly encouraged to select a minor in business or other appropriate area depending on their interests. Several field experience courses during the four-year program, as well as a capstone experience involving a semester-long internship required at the end of the ES major, afford students the opportunity to select an area of specialization in the field at sites available throughout the country.

Academic Program Learning Outcomes

Students in the exercise science program at NDSU engage in both didactic and experiential learning. Students will gain knowledge in several areas, including anatomy, kinesiology, biomechanics, behavior modification, physiology of exercise, cardiovascular and resistance training, and exercise testing and assessment.

Students graduating with an exercise science bachelor's degree should be able to:

- Properly determine and implement appropriate screening and assessment protocols for cardiovascular, muscular strength, muscular endurance, flexibility, and body composition analysis.
- Determine and implement safe and effective exercise programs for all components of health-related fitness for various populations including, but not limited to, those with cardiovascular, pulmonary, metabolic, orthopedic, and musculoskeletal conditions.
- Optimize exercise adoption and adherence through a variety of a professional skills including effective communication and motivational strategies.
- Complete comprehensive risk management, injury prevention, and emergency planning for health and fitness settings.

Career Options

The following list is not all-inclusive, but does identify some of the most common career and job opportunities in the four health-fitness settings. Exercise science graduates from NDSU (approximately 40 to 50 per year) are employed in these different settings across the country, especially in metropolitan areas. In the past few years, over 90% of exercise science students have either been enrolled in graduate school or have a professional job arranged at the time of graduation.

Commercial Setting – The greatest proportion of jobs can be found in for-profit, commercially run health-fitness facilities. The commercial environment is for someone interested in the marketing and sales of health-fitness services and products. This is also a good place for broad exposure to management in the health-fitness industry.

Community Setting – Many organizations and agencies serve clients in community settings, including voluntary, not-for-profit entities, as well as public parks and recreation agencies, schools and universities, hotels, country clubs and residential health-fitness developments. Many community-based facilities and programs offer exposure to health-fitness programming coupled with a social and recreational focus.

Corporate Setting – In-house health-fitness facilities and services found in large and small-scale businesses are expanding rapidly. The objectives of these facilities may include reductions in employee absenteeism, turnover rates and health care costs, while improving employee wellness, morale and enthusiasm in the workplace.

Clinical Setting – Hospital-based health-fitness facilities can be found in one out of every four hospitals, with a forecasted growth to almost one out of every two hospitals expected within the next decade. Most of these facilities are closely associated with outpatient services, such as physical therapy, sports medicine and cardiac rehabilitation, and frequently provide both types of programs in the same facility.

With an undergraduate degree and no experience, a starting salary averages $38,000 to $48,000 per year. However, the starting salary for health-fitness professionals is difficult to predict because of such factors as experience, geographic location, employment setting and market demand. It also may depend on licensure and certification. An advanced degree may pay more.

Pre-Exercise Science and Full Status Tracks

Admission to the pre-exercise science emphasis in ES occurs when the student applies to NDSU and declares an ES major. The pre-exercise science emphasis encompasses the first three semesters; transfer students are placed in the pre-exercise science emphasis upon acceptance. Entrance into the full status emphasis occurs through application at the end of the first semester of sophomore year or as transfer students complete the requirements below. The following requirements must be met before beginning the full status course of study:

1. Successful completion of courses with a grade of B or better:
   a. BIOL 220/220 L
   b. CHEM 121/121L

c. HNES 170
d. MATH 103,104 or higher
2. Minimum grade point average of 3.0
3. Completion of application to full status

Application guidelines are provided during classes (HNES 170) and advising sessions, and are also available on the department website.

High School Preparation

While in high school, a student should choose courses that provide a solid background in science, mathematics, business and communication. Individual commitment to lifetime fitness and personal health and well#being is very important. Volunteer work at a health-fitness facility and participation in local health fairs may provide valuable experiences in health-fitness programming.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	3	COMM 110	3
HNES 170	2	CSCI 114 or TL 116	3
PSYC 111	3	ENGL 120	3
MATH 103*	3	MATH 105*	3
Gen Ed Humanities/Fine Art and Global Perspectives	3	Gen Ed Humanities/Fine Arts and Cultural Diversity	3
	14		**15**
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
BIOL 220	3	BIOL 221	3
BIOL 220L	1	BIOL 221L	1
CHEM 121	3	CHEM 122	3
CHEM 121L	1	CHEM 122L	1
PHYS 211	3	HNES 365	3
PHYS 211L	1	STAT 330	3
HNES 250	3	Gen Ed Social & Behavioral Sciences	3
Complete Application to the Exercise Science Major***			
	15		**17**
Junior			
Fall	**Credits**	**Spring**	**Credits**
HNES 374	3	HNES 368	3
HNES 375	3	HNES 370	3
HNES 465	3	HNES 380	3
HNES 465L	1	HNES 491	1
Free Electives**	5	Free Electives	6
	15		**16**

Senior				
Fall	**Credits**		**Spring**	**Credits**
HNES 472		3	HNES 470	3
HNES 476		3	HNES 475	9
HNES 496		1		
Gen Ed Upper Division Writing		3		
Free Electives		6		
		16		**12**

Total Credits: 120

*
MATH 103 is a pre-requisite for STAT 330. MATH 105 is a pre-requisite for PHYS 211. If not needed due to placement scores or transfer, student will need the equivalent amount of credits in free electives.

**
Consult your advisor for suggested electives for certain Graduate and Professional programs.

***
Students apply for the Exercise Science Major during fall semester of sophomore year.
Application guidelines are provided during HNES 170 Introduction to Exercise Science and during advising sessions with freshmen, as well as on the Exercise Science (https://www.ndsu.edu/hnes/undergraduate_programs/exercise_science/program_information/) website. The following requirements must be met before beginning the major 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 if 'B' or better
5. Minimum NDSU cumulative GPA of 3.00 or higher

Exercise Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/hnes/ (http://www.ndsu.edu/hnes/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/exercise-science/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/exercise-science/#planofstudytext)

Major Requirements

Major: Exercise Science

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.

7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Exercise Science Requirements		
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory [1]	4
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 [1]	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
CSCI 114	Computer Applications	3
or TL 116	Business Software Applications	
HNES 170	Introduction to Exercise Science [1]	2
HNES 250	Nutrition Science	3
HNES 365	Kinesiology	3
HNES 368	Biomechanics of Exercise	3
HNES 370	Exercise and Disease	3
HNES 374	Methods in Resistance Training and Cardiovascular Conditioning	3
HNES 375	Research Methods and Design in Exercise Science	3
HNES 380	Exercise Behavior	3
HNES 465	Exercise Physiology	3
HNES 465L	Exercise Physiology Laboratory	1
HNES 472	Exercise Assessment and Prescription	3
HNES 476	Exercise Testing Laboratory	3

HNES 470	Professional Practices in Exercise Science (HNES 778) [2]	3
HNES 475	Exercise Science Internship (HNES 794) [2]	9
HNES 491	Seminar	1
HNES 496	Field Experience	1
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PSYC 111	Introduction to Psychology	3
STAT 330	Introductory Statistics	3
Total Credits		**76**

1

Requires a grade of 'B' or better.

2

Students approved for the accelerated program take the graduate courses in place of the undergraduate courses.

Degree Requirements and Notes

- A cumulative GPA of 3.00 is required for graduation. No grades of 'D' or 'F' may be used to satisfy Exercise Science major courses.
- With the exception of field experiences, seminar, and internship, courses under the Exercise Science requirements may not be taken Pass/Fail.

Accelerated Undergraduate to Master's Degree Program

- Students may participate in an accelerated program in the following area:
  - B.S. Exercise Science to M.A. Trg. Master of Athletic Training
    - Program information and application process are found here (https://catalog.ndsu.edu/programs-study/graduate/athletic-training/).
- Undergraduate students must have completed a minimum of 60 undergraduate credits with a cumulative GPA of 3.00 or higher.
- Students are required submit an application to the Graduate School and an *Accelerated Degree Program Declaration* form prior to any graduate work.

Extension Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/extension-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/extension-education/)

The Extension Education Minor provides educational background and presentation skills for individuals who seek careers associated with Extension. This minor is offered to all student across the University pursuing any degree program. The minor is appropriate for many majors across the university including Human Development and Family Science, as well as majors within the College of Agriculture, Food Systems, and Natural Resources.

If you seek the preparation to utilize your primary major toward helping people in all parts of our communities by extending the knowledge of NDSU to benefit them, the Extension Education Minor is a perfect addition to your undergraduate studies. Along with foundational courses in Extension Education and teaching & learning, you will engage in a required internship experience through an Extension system office. Giving you the hands-on, real-world experience, you need for success! The Extension Education Minor can be added to any plan of study.

Extension Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/extension-education/ (http://catalog.ndsu.edu/programs-study/extension-education/)

Minor Requirements

Minor: Extension Education

Required Credits: 17-18

Code	Title	Credits
Required Courses		
H&CE 445	Designing and Delivering Nonformal Education Programs	3
or NRM 421	Environmental Outreach Methods	
or H&CE 468	Foundations of Family and Consumer Sciences Education	
or H&CE 481	Methods of Teaching Agriculture	
H&CE 446	Extension Education (Required)	3
EDUC 322	Educational Psychology	3
or HDFS 230	Life Span Development	
Select one from the following:		3
H&CE 480	Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education	
HDFS 462	Methods of Family Life Education	
ENGL 459	Researching and Writing Grants and Proposal	
PLSC 312	Expanding the Boundaries of Learning with Service	
H&CE 496	Field Experience (Internship) *	5-6
Total Credits		**17-18**

*
Additional Field Experience credit may be warranted if additional time in the internship experience is required.

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Discuss options of courses with either Dr. Mari Borr or Dr. Adam Marx depending upon your intended Extension direction.

Family and Consumer Sciences Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/family-consumer-sciences-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/family-consumer-sciences-education/)

The Program

Candidates in the Family and Consumer Sciences (FACS) Education major are prepared to guide a variety of teaching and learning experiences for students in grades 5-12, in occupational or non-occupational programs, adult programs, or to serve as an Extension educator. Hands-on experience is provided throughout the program to develop the teaching skills learned in classes.

The Family and Consumer Sciences (FACS) Education major has two pathways to prepare future educators:

1. **Teacher Licensure Pathway**- prepares candidates to teach at the middle, secondary, post-secondary and adult levels in FACS education programs. North Dakota State University is designated by the State Board of Career and Technical Education as the recognized institution for preparing teachers of Family and Consumer Sciences Education.
2. **Training and Development Pathway** - prepares candidates to develop and deliver educational programming in corporate training settings, Extension, and non-profit organizations. Students will learn to work with youth and adults in diverse educational environments. This pathway and program is unique to North Dakota State University.

Courses from all areas of Family and Consumer Sciences including individuals and families, nutrition and wellness, apparel, and consumer decision making are included in the program. This contributes to the versatility of the major since the broad range of knowledge may be applied to a wide variety of settings as an educator and/or a family and consumer scientist.

professional education courses

The FACS Education Teacher Licensure program is a collaboratively delivered program between the Department of Youth Development, Family, and Agricultural Education in the College of Agriculture, Food, Systems, and Natural Resources as well as the School of Education in the College of Arts and Sciences. Teacher candidates may enroll in the 200 and 300-level professional education courses (H&CE and EDUC) before being formally admitted to School of Education (SOE) coursework. Prior to enrolling in the 400-level EDUC courses, teacher candidates must complete the application for admission to the SOE. Requirements for admission can be found at the **NDSU Teacher Education** website.

Internship Capstones

Each of the pathways in the FACS Education major require an internship as the capstone experience to the degree. In the Teacher Licensure Pathway, that internship is Student Teaching. During Student Teaching, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced agricultural educators in middle or secondary schools.

In the Training and Development Pathway, the internship is typically within the corporate setting, educational organization setting, or within an Extension setting. These candidates will also apply content and teaching and learning skills in their respective setting. They will develop and evaluate educational programming in a real-world setting, impacting the lives of others.

Student Advisement

An academic advisor works individually with family and consumer sciences teacher candidates to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to seek their advisor's help whenever needed.

Licensure

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

Career Opportunities

FACS teachers continue to be in high demand around the country. Graduates pursuing a career in teaching become employed in both traditional and nontraditional teaching situations. Settings include teaching in middle and secondary schools and vocational centers. Other career options include employment as consultants in teaching family and consumer sciences at the elementary school level or serving as family and consumer sciences teachers for special education students. Teachers of adult programs work with various agencies and local school districts offering adult enrichment, continuing education, evening and summer classes, and programs for special groups such as parents, senior citizens and migrant workers.

Financial Aid and Scholarships

Information about various loans, grants, general scholarships and employment is available through the Office of Financial Aid and Scholarships or One Stop. Scholarships ranging from $500 to $1,000+ are offered to FACS students through the College of Agriculture, Food Systems, and Natural Resources. Annually, more than $30,000 is available to support NDSU FACS Education students at all levels.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
HDFS 186	3	H&CE 232	3
HDFS 230 or PSYC 250	3	ENGL 120	3
ENGL 110	3	COMM 110	3
CSCI 114	3	MATH 104	3
SOC 110	3	HPER 217	3
	15		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
ARMD 101 or 155	3	ARMD 210	3
EDUC 321	3	H&CE 469	3

H&CE 467	3	HDFS 242	3
CHEM 117	3	HDFS 250	3
Gen Ed Science Lab	1	EDUC 322	3
PSYC 111	3	Apply to the School of Education	
Complete Core Academic Skills Exam or access your ACT+ scores			
	16		**15**

Third Year

Fall	Credits	Spring	Credits
HDFS 275	3	HNES 261 & 261L	5
HDFS 341	3	EDUC 451	3
HNES 250	3	H&CE 468	3
H&CE 446	3	ID 151, 315, or 316	3
ENGL 358	3		
Gen Ed Science and Tech and Global Perspective	3		
	18		**14**

Fourth Year

Fall	Credits	Spring	Credits
ARMD 366	3	H&CE 483	1
ARMD 367	1	H&CE 487	9
HDFS 357	3	H&CE 488	3
EDUC 486	3		
EDUC 489	3		
H&CE 482	3		
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
	16		**13**

Total Credits: 122

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year

Fall	Credits	Spring	Credits
HDFS 186	3	HPER 217	3
HDFS 230 or PSYC 250	3	H&CE 232	3
ENGL 110	3	ENGL 120	3
CSCI 114 or TL 116	3	COMM 110	3
SOC 110	3	MATH 104	3
	15		**15**

Second Year				
Fall	**Credits**		**Spring**	**Credits**
ARMD 101		3	ARMD 210	3
EDUC 322		3	HDFS 462	3
H&CE 467		3	H&CE 469	3
PSYC 111		3	HDFS 242	3
CHEM 117		3	ADHM, HNES, or H&CE Elective	3
Gen Ed Science & Tech Lab		1		
		16		**15**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
HDFS 250		3	ID 316	3
H&CE 196		3	HDFS 275	3
H&CE 446		3	HNES 261 & 261L	5
ARMD, HNES, or H&CE Elective		3	EDUC 451	3
ENGL 358		3	H&CE 445 or 468	3
Gen Ed Science & Tech/Global Perspective		3		
		18		**17**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
ARMD 366		3	H&CE 496	10
ARMD 367		1		
HDFS 341		3		
HDFS 357		3		
HNES 250		3		
ADHM, HNES, or H&CE Elective		3		
		16		**10**

Total Credits: 122

Family and Consumer Sciences Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/family-consumer-sciences-education/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/family-consumer-sciences-education/#planofstudytext)

Major Requirements

Major: Family & Consumer Sciences Education

Degree Type: B.S.
Minimum Degree Credits to Graduate: 124

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

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Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Common Content Courses Family & Consumer Sciences Requirements		
CHEM 117	Chemical Concepts and Applications	3
CSCI 114	Computer Applications	3
or TL 116	Business Software Applications	
PSYC 111	Introduction to Psychology	3
SOC 110	Introduction to Sociology	3
ARMD 101	Beginning Apparel Construction	3
or ARMD 155	Apparel Construction and Fit	
ID 151	Design Fundamentals	3
or ID 315	History of Interiors I	
or ID 316	History of Interiors II	
ARMD 210	Dress in World Cultures	3
or ARMD 486	Dress and Human Behavior	
ARMD 366	Textiles	3
ARMD 367	Textiles Laboratory	1

H&CE 469	Housing Education and Issues	3
HDFS 186	Smart Spending and Saving	3
HDFS 230	Life Span Development	3
or PSYC 250	Developmental Psychology	
HDFS 242	Couples, Marriages and Families	3
HDFS 250	Introduction to Research Methods in Human Development and Family Sciences	3
HDFS 275	Diversity and Multiculturalism in Individual and Family Life	3
HDFS 341	Parent-Child Relations	3
HDFS 357	Personal and Family Finance	3
HPER 217	Personal and Community Health	3
HNES 250	Nutrition Science	3
HNES 261 & 261L	Food Selection and Preparation Principles and Food Selection and Preparation Principles Laboratory	5
Education/Training Courses		
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
H&CE 232	Philosophy and Policy	3
H&CE 467	Leading Youth Organizations	3
Family & Consumer Science Pathway Option Requirements		
Select Pathyway A (Licensure - Education Courses) or Pathway B (Non-Licensure Training and Development Courses)		22-28
Total Credits		**94-100**

Code	Title	Credits
Pathway A (Licensure) Education Courses		
EDUC 321	Introduction to Teaching	3
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
H&CE 468	Foundations of Family and Consumer Sciences Education	3
H&CE 482	Methods of Teaching Family and Consumer Sciences	3
H&CE 483	Student Teaching Seminar	1
H&CE 487	Student Teaching	9
H&CE 488	Applied Student Teaching	3
Total Credits		**28**

Code	Title	Credits
Pathway B (Non-Licensure) Training and Development Courses		
HDFS 462	Methods of Family Life Education	3
H&CE 196	Field Experience	3
H&CE 445	Designing and Delivering Nonformal Education Programs	3
or H&CE 468	Foundations of Family and Consumer Sciences Education	
H&CE 446	Extension Education	3
H&CE 496	Field Experience (Internship Captsone)	10
Total Credits		**22**

Degree Requirements and Notes

- A grade of 'C' or better is required in all Professional Education Requirement courses.

- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.
- See School of Education (https://www.ndsu.edu/education/) for admission requirements.

Family Financial Planning

Department Information

- **Department Web Site:**
  www.ndsu.edu/hdfs/ (http://www.ndsu.edu/hdfs/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/family-financial-planning/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/family-financial-planning/)

The Family Financial Planning undergraduate certificate is designed for students who want to help individuals and families with financial challenges work toward long-term financial well-being. Required courses give students experience in consumer issues, personal and family financial planning, and financial counseling, and are grounded in real-world, hands-on learning opportunities. Students will learn foundational information as well as how to apply it in practice with both individuals and families. Completion of the certificate makes students eligible to take the Accredited Financial Counseling exam, the first step in becoming an Accredited Financial Counselor (AFC) ©.

Family Financial Planning

Department Information

- **Department Web Site:**
  www.ndsu.edu/hdfs/ (http://www.ndsu.edu/hdfs/)
- **Credential Offered:**
  UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/family-financial-planning/ (http://catalog.ndsu.edu/programs-study/undergraduate/family-financial-planning/)

Certificate Requirements

Family Financial Planning

Required Credits: 9

Code	Title	Credits
HDFS 186	Smart Spending and Saving	3
HDFS 357	Personal and Family Finance	3
HDFS 477	Financial Counseling	3
Total Credits		**9**

Finance

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/finance/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/finance/)

As a finance major, you will learn the fundamental concepts and tools to make informed and responsible financial decisions using data and creativity. Finance students know how to estimate economic value and evaluate the riskiness of a project or a financial asset, to advise firms about paying for projects, and to appraise a firm's performance on the stock market. We successfully place our graduates in business, industry and non-profit organizations.

Background Information

AACSB International, The Association to Advance Collegiate Schools of Business, accredits the undergraduate and graduate programs in the College of Business at North Dakota State University. The College of Business is one of only two accredited schools of business in North Dakota.

AACSB International is one of higher education's most prestigious and rigorous accrediting bodies, stressing academic excellence and a commitment to continuous improvement. Less than 10 percent of business programs worldwide have this accreditation.

The Program

Business students take core courses that cover all of the functional areas of a business, from marketing to management and accounting. Finance courses build on this foundation to help students understand the way that businesses operate in a global economy. Courses cover corporate finance, international finance, investments, portfolio management and more. The finance program is approved as a CFA Institute University Affiliation Program which positions students well to obtain the Chartered Financial Analyst® designation, the most respected and recognized investment credential in the world. Your assignments might be project-driven or include group presentations so that you can practice what you learn in class. In addition to a thorough knowledge of finance, you'll learn teamwork, effective written and oral communication skills, and leadership.

CERTIFICATE

Any student (degree-seeking or non-degree seeking) can enhance their employability by adding a Certificate in Finance to their major or credentials. The minimum number of credits is nine (9). Finance Certificate-seeking students must take Finance 320—Principles of Finance and then select two additional courses from the available course list.

HANDS-ON EXPERIENCE

Business students can join the Bison Fund (Student Managed Investment Fund) to get a chance to manage a real-money investment fund worth more than $2.5 million using state-of-the-art Bloomberg terminals in the Commodities Trading Lab. The Bison Fund brings financial theory and investment practice together while providing students access to the same data used by Wall Street analysts.

Selective Admission

Students who wish to study finance at NDSU enroll as pre-finance majors in the College of Business for the first semester of their freshman year. Pre-finance majors then apply for admission to the major after completing the pre-major courses required for major admission, including ENGL 120, COMM 110, MATH 144, ECON 201 or 202, and PSYC 111 or SOC 110. Transfer students with appropriate course work may also apply. Please see a College of Business professional academic advisor for more information.

Admission to the major is based upon the successful completion of the pre-major course requirements and a minimum cumulative grade point average (GPA) of 2.50.

The Faculty

In order to provide a rigorous and timely educational experience, we have recruited and attracted faculty who are highly qualified to teach finance. Dedicated to student learning, our faculty have often been recognized for their teaching excellence by students and colleagues. The faculty employ a wide variety of instructional techniques and are considered especially strong in approaches to the study of organizations and management decision making. They remain current in their sub-fields of finance by actively engaging in research and constantly assisting firms in identifying and solving business problems.

The Practicum

Finance majors are encouraged to complete a three-credit practicum. The practicum is designed to enable students to relate finance concepts learned in the classroom to actual business situations and to give them a competitive edge in job placement.

Career Opportunities

Graduates with a finance major have opportunities in business, industry, government service, and the non-profit sector, both regionally and globally. Job opportunities for finance majors are found in corporate finance and the financial services industries, such as banking, insurance, brokerage, investment banking and financial planning. Median salary for finance majors is currently $67,800.

The College

The College of Business also offers majors in accounting, business administration, management, marketing, management information systems, and global business (second major only), as well as Master of Business Administration and Master of Accountancy degrees.

High School Preparation

It is recommended that high school students interested in studying finance at the university level take mathematics courses at least through pre-calculus. High school electives in the social sciences, English and communication would also be of benefit. Please speak with a professional advisor for more information.

Sample Program Guide

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Freshman				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110		3	COMM 110	3
TL 116		3	ENGL 120	3
Gen Ed Humanities/Fine Arts and Cultural Diversity		3	MATH 144	4
Gen Ed Wellness		2	PSYC 111 or SOC 110	3
Free Elective		3	Free 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	Gen Ed Science & Tech/Lab	4
Gen Ed Science & Technology		3	FIN 320	3
		15		**15**
Junior				
Fall	**Credits**		**Spring**	**Credits**
MGMT 320		3	BUSN 430	3
MRKT 320		3	300-400 Level Finance or Commercial Banking Elective	3
FIN 410		3	ENGL 320	3
FIN 430		3	FIN 330	3
MIS 320		3	FIN 420	3
		15		**15**
Senior				
Fall	**Credits**		**Spring**	**Credits**
FIN 460		3	BUSN 489	3
300-400 Level Finance or Commercial Banking Elective		6	300-400 Level Finance or Commercial Banking Electives	3
300-400 Level Free Elective		3	300-400 Level Free Electives	3
Free Elective		3	FIN 440	3
			Free Elective	3
		15		**15**

Total Credits: 120

Finance

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/finance/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/finance/#planofstudytext)

Major Requirements

Major: Finance

Degree Type: B.S.
Minimum Credits Required for Degree: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Requirements for Admission to Pre-Major Requirements:		
COMM 110	Fundamentals of Public Speaking [2]	3
ENGL 120	College Composition II [2]	3

MATH 144	Mathematics for Business [2]	4
PSYC 111	Introduction to Psychology [2]	3
or SOC 110	Introduction to Sociology	
ECON 201	Principles of Microeconomics [2]	3
or ECON 202	Principles of Macroeconomics	
Finance Major Requirements:		
TL 116	Business Software Applications [2]	3
ACCT 200	Elements of Accounting I [2]	3
ACCT 201	Elements of Accounting II [2]	3
ECON 202	Principles of Macroeconomics (Select the course not taken for the pre-major.) [2]	3
or ECON 201	Principles of Microeconomics	
PHIL 216	Business Ethics [2]	3
ENGL 320	Business and Professional Writing [2]	3
STAT 330	Introductory Statistics [2]	3
STAT 331	Regression Analysis [2]	2
Admission to major program required prior to taking the following courses:		
FIN 320	Principles of Finance [1, 2]	3
MGMT 320	Foundations of Management [1,2]	3
MIS 320	Management Information Systems [1,2]	3
MRKT 320	Foundations of Marketing [1,2]	3
FIN 330	Data Analytics in Finance [2]	3
FIN 410	Investment Analysis and Management [2]	3
FIN 420	Options, Futures, and Other Derivatives [2]	3
FIN 430	Management of Financial Institutions [2]	3
FIN 440	International Finance [2]	3
FIN 460	Corporate Finance [2]	3
BUSN 430	Legal and Social Environment of Business [1, 2]	3
BUSN 489	Strategic Management (Capstone Course) [1, 2]	3
300-400 Level Electives [2]		
Select any course prefix at the 300-400 level		6
Finance Electives or Commercial Banking Track [2]		
Select may complete 12 credits of 300-400 level courses with the FIN prefix or they may declare the Commercial Banking Track and complete the courses outlined in the track below.		12
Total Credits		**93**

Commercial Banking Track

Code	Title	Credits
FIN 450	Advanced Bank Management [2]	3
FIN 451	Credit Analysis [2]	3
FIN 452	Real Estate Lending [2]	3
FIN 453	Risk Management in Banking [2]	3
Total Credits		**12**

1

Denotes Common Body of Knowledge (CBK) course.

2

Grades must be a C or better for all courses used to satisfy this requirement.

Degree Requirements and Notes:

- A minimum 2.5 cumulative GPA is required for admission to the major, to enroll in 300-400 level courses, and to graduate.
- 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.

- For admission to the finance major, students must submit an online application to the CoB.
- A letter grade must be earned in any course that fulfills a major requirement (with the exception of some practicum options).
- 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 cannot be taken with this major.

Certificate Requirements

Certificate: Finance

Minimum Required Credits: 9

Code	Title	Credits
FIN 320	Principles of Finance	3
Select 2 courses from the following:		6
FIN 410	Investment Analysis and Management	
FIN 420	Options, Futures, and Other Derivatives	
FIN 430	Management of Financial Institutions	
FIN 440	International Finance	
FIN 450	Advanced Bank Management	
FIN 451	Credit Analysis	
FIN 460	Corporate Finance	
FIN 470	Analysis of Fixed-Income Securities	
FIN 480	Applied Portfolio Management	
Total Credits		**9**

Degree Notes:

- Students must earn a 2.50 cumulative GPA in the courses used to satisfy the certificate requirements.
- Courses may not be taken Pass/Fail.
- Required courses for the certificate may require prerequisites.

Food Science

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/plantsciences/ (http://www.ag.ndsu.edu/plantsciences/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/food-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/food-science/)

Food science deals with the transformation of raw agricultural goods into food products acceptable for human consumption. This field of applied science involves studying diverse scientific disciplines such as chemistry, engineering, microbiology, biochemistry, toxicology and management as they relate to food, and effectively applying the industrial and practical aspects to product development, food processing, preservation and marketing.

The Faculty and Facilities

Food science is a four-year curriculum offered by the College of Agriculture, Food Systems, and Natural Resources through the Department of Plant Sciences. The program draws on the expertise of faculty members in several departments at North Dakota State University who have expertise in both teaching and research. Many have industry experience with numerous connections in the food industry.

The Peltier Complex at NDSU houses laboratories and teaching facilities where many of the food science courses are taught. Extensive facilities are available for teaching and food processing research.

The Curriculum

The program includes courses in food chemistry, food analysis, food microbiology, food fermentation, food processing, biological materials processing, meat science, nutrition science and cereal technology, in addition to basic courses in mathematics, the sciences, humanities and social sciences. Most of the applied courses in food science are taken after the basic courses have laid the groundwork for the student.

The program allows flexibility in selecting suitable electives to direct one's career goal. Areas of emphasis include food safety, microbiology, sciences, business and management, engineering, nutrition and processing.

The curriculum for food science is approved by the Institute of Food Technologists (IFT) (https://www.ift.org/community/students/undergraduate-programs/). The four-year undergraduate program leads to a Bachelor of Science degree in food science. The program enables graduates to recognize, critically analyze and solve problems realistically in both industrial and academic environments. It provides the opportunity to gain industrial experience during undergraduate study by means of industry internships.

A great way to continue higher education for students currently enrolled in Food Science at North Dakota State University is to consider the Accelerated Master of Science in Cereal Science program, where fifteen of the didactic credits (600/700 level) can be used to meet the requirement for the B.S. degree. Please, see the Cereal Science Accelerated M.S. page (https://catalog.ndsu.edu/programs-study/graduate/cereal-science/#acceleratedtext) for more details. There are additional opportunities for students majoring in other disciplines to learn more about Food Science - students can opt for minor in Food Science and Technology (https://catalog.ndsu.edu/programs-study/undergraduate/food-science-technology/).

Career Opportunities

Challenging and rewarding entry-level positions in the food industry are plentiful for food science graduates. Potential employers include large and small food corporations and government agencies. Career opportunities include positions in food science and technology, food chemistry, food microbiology, product development, quality control, food production and processing, food inspection, packaging, sales and marketing. The median salary for a food professional in US is $110,000 and an individual with a B.S. degree in food science is $98,163 according to the Institute of Food Technologists' 2022 Salary Survey.

Food scientists study food to improve existing products or create new ones. They also analyze the structure and composition of food and the changes that occur during processing and storage. They determine how processing affects flavor, texture, appearance and nutritional value, and explore new ways to protect and stabilize food through packaging.

The food industry is the largest industry in the world. The challenges of food scientists are to provide wholesome, tasty and nutritious foods for the consumer.

Industry Internships

Internships offered through NDSU's food science department and Cooperative Education programs provide opportunities for industry experience at companies such as Ardent Mills, Cargill, 8th Avenue Pasta, Hormel, Jennie-O, SunOpta, and others.

Financial Aid and Scholarships

Loans, scholarships, grants and work-study are made available through the Office of Financial Aid and Scholarships. A number of scholarships are awarded each year to students enrolled in the College of Agriculture, Food Systems, and Natural Resources. Please see: CAFSNR scholarships (https://www.ndsu.edu/agriculture/academics/scholarships/) for more information. Departmental (Food Science program) scholarships also are available. Information may be obtained by contacting the coordinator of the food science program. A number of laboratory assistant jobs are available for students majoring in food science.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
BIOL 150	3	BIOL 151	3
CFS 210	3	CHEM 122 & 122L	4
CHEM 121 & 121L	4	COMM 110	3
ENGL 110	3	ENGL 120	3
PLSC 189	1	MATH 146 or 165	4
Gen Ed Humanities/Fine Arts	3		
	17		**17**

Sophomore				
Fall	**Credits**		**Spring**	**Credits**
CFS 370		3	BIOC 260 or 460 ***and*** 460L	4
CSCI 114 or TL 116		3	ECON 201	3
PHYS 211 & 211L		4	HNES 250	3
Gen Ed Humanities/Fine Arts and Cultural Diversity		3	Gen Ed Social and Behavioral Sci	3
Elective		3		
		16		**13**
Junior				
Fall	**Credits**		**Spring**	**Credits**
CFS 450		3	CFS 452	3
CHEM 341 & 341L		4	CFS 470	3
MICR 350 & 350L		5	CFS 471	1
Gen Ed Upper Division Writing		3	CFS 474	3
			STAT 330	3
			Free Elective	3
		15		**16**
Senior				
Fall	**Credits**		**Spring**	**Credits**
CFS 460		3	ANSC 340	3
CFS 461		1	CFS 464	3
MICR 453		2	CFS 480	3
Free Elective		8	Free Elective	3
		14		**12**

Total Credits: 120

Food Science

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/plantsciences/ (http://www.ag.ndsu.edu/plantsciences/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/food-science/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/food-science/#planofstudytext)

Major Requirements

Major: Food Science

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.

3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Required Core Courses for Food Science		
PLSC 189	Skills for Academic Success	1
ANSC 340	Principles of Meat Science	3
CFS 210	Introduction to Food Science and Technology	3
CFS 370	Food Processing I	3
CFS 450	Cereal Technology	3
CFS 452	Food Laws and Regulations	3
MICR 453	Food Microbiology	2
CFS 460	Food Chemistry	3
CFS 461	Food Chemistry Laboratory	1
CFS 464	Food Analysis	3
CFS 470	Food Processing II	3
CFS 471	Food Processing Laboratory	1
CFS 473	Food Safety	3
CFS 474	Sensory Science of Foods	3
CFS 480	Food Product Development (Capstone)	3
Select one of the following:		3-4
BIOC 260	Elements of Biochemistry	

BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and	
BIOL 150	General Biology I	3
BIOL 151	General Biology II	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CSCI 114	Computer Applications (May satisfy general education category S)	3
or TL 116	Business Software Applications	
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
HNES 250	Nutrition Science (May satisfy general education category W)	3
MATH 146	Applied Calculus I (May satisfy general education category R)	4
or MATH 165	Calculus I	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PHYS 211 & 211L	College Physics I and College Physics I Laboratory (May satisfy general education category S)	4
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Total Credits		**84-85**

1

PLSC189 is only required for first-time, first-year students--A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take PLSC189.

Degree Requirements and Notes:

- A 2.00 cumulative GPA is required for graduation and to remain in program.
- The department would highly recommend students consider taking CFS 462 Food Ingredient Technology and CFS 472 Cereal and Food Fermentation as electives courses for the degree.

Food Science and Technology

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/plantsciences/ (http://www.ag.ndsu.edu/plantsciences/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/food-science-technology/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/food-science-technology/)

Food Science and Technology is an academic minor program with a mission to provide students with the skills necessary to be successful in a career that provides people with safe, nutritious, high quality foods and lifelong learning through research, teaching, and outreach activities.

Food Science and Technology

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/plantsciences/ (http://www.ag.ndsu.edu/plantsciences/)
- **Credential Offered:**
  Minor
- **Program Overview:**

catalog.ndsu.edu/programs-study/undergraduate/food-science-technology/ (http://catalog.ndsu.edu/programs-study/undergraduate/food-science-technology/)

Minor Requirements

Minor: Food Science & Technology

Minimum Required Credits: 19

Code	Title	Credits
Required Core		
CFS 210	Introduction to Food Science and Technology	3
CFS 370	Food Processing I	3
CFS 464	Food Analysis	3
CFS 470	Food Processing II	3
CFS 471	Food Processing Laboratory	1
CFS 452	Food Laws and Regulations	3
Elective Courses: Select 3 credits from the following:		3
ANSC 340	Principles of Meat Science	
ANSC 344	Fundamentals of Meat Processing	
CFS 450	Cereal Technology	
CFS 460	Food Chemistry	
CFS 461	Food Chemistry Laboratory	
CFS 474	Sensory Science of Foods	
CFS 480	Food Product Development	
MICR 453	Food Microbiology	
PLSC 210	Horticulture Science	
PLSC 415	Vegetable Crop Production	
Total Credits		**19**

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.
- Only grades of "C" or better accepted for minor courses.

Forensic Science

Department Information

- **Department Web Site:**
  https://www.ndsu.edu/programs/undergraduate/criminal-justice
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/forensic-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/forensic-science/)

The minor in forensic science is an interdisciplinary program that offers students a comprehensive understanding of the key concepts and methodologies used in the field of forensic science. This minor combines courses from criminal justice, chemistry, biology, psychology, and philosophy to provide students with a foundation in forensic science investigations. In addition to learning the basic principles and techniques used in forensic analysis, in these courses, students will also learn about the legal framework and procedures relevant to forensic investigations; analytical chemistry techniques used in forensic analysis; DNA analysis, genetic profiling, and its applications; crime scene management, evidence collection, and analysis; and offender profiling, eyewitness testimony, and the psychology of criminal behavior.

Forensic Science

Department Information

- **Department Web Site:**
  ndsu.edu/criminaljustice/ (http://ndsu.edu/criminaljustice/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/forensic-science/ (http://catalog.ndsu.edu/programs-study/undergraduate/forensic-science/)

Minor Requirements

Minor: Forensic Science

Required Credits: 23

Minor Requirement

Code	Title	Credits
Required Minor Classes		
CJ 260	Introduction to Forensic Science	3
CJ 430	Issues in Forensic Science	3
BIOL 111	Concepts of Biology [1]	3
or BIOL 150	General Biology I	
BIOL 100L	Non-Majors Biology Lab [1]	1
or BIOL 150L	General Biology I Laboratory	
CHEM 117	Chemical Concepts and Applications [1]	3
or CHEM 121	General Chemistry I	
or CHEM 150	Principles of Chemistry I	
CHEM 117L	Chem Concepts and Applications Lab [1]	1
or CHEM 121L	General Chemistry I Laboratory	
or CHEM 160	Principles of Chemistry Laboratory I	
Minor Electives		
Select from the following - 6 of the 9 credits must be courses with prefixes outside of the student's chosen major:		9
BIOL 315	Genetics	
BIOL 479	(Biomedical Genetics and Genomics)	
CHEM 240	Survey of Organic Chemistry	
CHEM 341	Organic Chemistry I	
CHEM 342	Organic Chemistry II	
CJ 226	Criminal Investigation	
CJ 330	Criminal Law and Procedure	
PHIL 111	Professional Responsibility and Ethics	
PSYC 270	Abnormal Psychology	
PSYC 370	Forensic Psychology	
Total Credits		**23**

1

Complete the matching lecture/lab combination (BIOL 111/110L; BIOL 150/150L; CHEM 117/117L; CHEM 121/121L; CHEM 150/160)

Fraud Investigation

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/fraud-investigation/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/fraud-investigation/)

The Department of Accounting and Information Systems, in collaboration with the Department of Criminal Justice, offers a minor in Fraud Investigation. Students will study the causes of fraud, as well as the detection, investigation, and prevention of fraud. Students learn about the criminal justice system including law making, criminality, and prosecution of fraud and other types of crime. This minor will prepare students for possible careers in crime investigation, litigation support, or forensic accounting.

Fraud Investigation

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/fraud-investigation/ (http://catalog.ndsu.edu/programs-study/undergraduate/fraud-investigation/)

Minor Requirements

Minor: Fraud Investigation

Required Credits: 18

Code	Title	Credits
Core Requirements		
TL 116	Business Software Applications [1]	3
ACCT 200	Elements of Accounting I [1]	3
ACCT 410	Fraud Examination [1,2]	3
ACCT 411	Advanced Fraud Examination via Data Analytics [1,3]	3
Select two from the following: [1]		6
CJ 330	Criminal Law and Procedure	
SOC 233	Sociology of Organizations and Work	
MIS 320	Management Information Systems	
Total Credits		**18**

1

A grade of C or better is required in all courses required for this minor.

2

ACCT 410 Fraud Examination may be substituted if the student has taken ACCT 610 Fraud Examination and formally requests the course be applied to undergraduate degree requirements.

3

ACCT 411 Advanced Fraud Examination via Data Analytics may be substituted if the student has taken ACCT 611 Advanced Fraud Examination via Data Analytics and formally requests the course be applied to undergraduate degree requirements.

Minor Requirements and Notes

- Students must maintain a minimum institutional cumulative GPA of 2.50. Courses may not be taken pass/fail.
- A minimum of 8 credits must be taken at NDSU.

Fundamentals of Computing & Security

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**

catalog.ndsu.edu/undergraduate/program-curriculum/fundamentals-computing-security/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/fundamentals-computing-security/)

The Fundamentals of Computing and Security certificate provides an easy entry point for students who are interested in computing and security and may lack prerequisites for our more theoretical computer science courses. CSCI 227 Computing Fundamentals in Python I is the first course in a two-course Python-based computing sequence that satisfies programming requirements in our Computer Science and Cybersecurity programs.

Fundamentals of Computing & Security

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  UG Certificate
- **Program Overview:**
  www.catalog.ndsu.edu/programs-study/undergraduate/fundamental-computing-security/ (http://www.catalog.ndsu.edu/programs-study/undergraduate/fundamental-computing-security/)

Certificate Requirements

Fundamentals of Computing and Security

Required Credits: 9

Required Courses

Code	Title	Credits
CSCI 105	Introduction to Cybersecurity	3
CSCI 159	Computer Science Problem Solving	3
CSCI 227	Computing Fundamentals in Python I	3
Total Credits		**9**

General Agricultural

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/academics/ (http://www.ag.ndsu.edu/academics/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/general-agriculture/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/general-agriculture/)

The General Sciences minor is designed to serve students who wish to pursue a minor education in the broad area of agriculture. The minor allows students to tailor a degree to meet their career objectives in the broad Agriculture, Food Systems, and Natural Resources (AFSNR) industries.

General Agriculture

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/academics/ (http://www.ag.ndsu.edu/academics/)
- **Credential Offered:**
  Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/general-agriculture/ (http://catalog.ndsu.edu/programs-study/undergraduate/general-agriculture/)

Minor Requirements

Minor: General Agriculture

Required Credits: 24

Code	Title	Credits
Required Courses *		
Select six (6) credits minimum in any four (4) emphases 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.

Gerontology

Department Information

- **Department Web Site:**
  www.ndsu.edu/hdfs/ (http://www.ndsu.edu/hdfs/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/gerontology/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/gerontology/)

A minor in Gerontology provides students with an integrated understanding of the process of aging, aging services, and older adults in America. The minor can benefit students interested in a variety of careers that involve work with the older adult population. Students from a variety of majors such as human development and family science, sociology, psychology, nursing, pharmacy, interior design, and education can benefit from training in gerontology.

Career Opportunities

Career interests available would depend on the major or other training but include designer/architect of housing facilities, adult day services, older adult volunteer services, mental health services for older adults, geriatric nursing, social service programs for older adults, long-term care administration, corporate health planning or market research. Explore more careers here. (https://www.ndsu.edu/hdfs/student_resources/career_planning/careers_in_aging/)

Gerontology

Department Information

- **Department Web Site:**
  www.ndsu.edu/socanth/ (http://www.ndsu.edu/socanth/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/gerontology/ (http://catalog.ndsu.edu/programs-study/undergraduate/gerontology/)

Minor Requirements

Minor: Gerontology

Required Credits: 17-18

Code	Title	Credits
Core Requirements		
HDFS 360	Adult Development and Aging	3
HDFS 480	Community Resources of Later Life	3
HDFS 482	Family Dynamics of Aging	3
HDFS 496	Field Experience (with a focus on aging)	3
Electives - Select two courses from the following:		5-6
NURS 252	(available only to those admitted to the Nursing program)	
PSYC 471	The Psychology Of Aging	
SOC 440	Sociology of Aging	
SOC 441	Death and Dying	
Total Credits		**17-18**

Minor Requirements and Notes

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

GIS and Remote Sensing

Department Information

- **Department Web Site:**
  www.ndsu.edu/eegs/ (http://www.ndsu.edu/eegs/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/gis-remote-sensing/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/gis-remote-sensing/)

Use and applications of GIS and Remote Sensing continue to grow and be desirable skill sets in many careers. This certificate program will provide both the depth and breadth of skills necessary for utilizing geospatial data in diverse careers. The certificate is available to Undergraduate and Graduate students from any discipline and provides an opportunity for students to acquire additional credentials in the field.

GIS and Remote Sensing

Department Information

- **Department Web Site:**
  www.ndsu.edu/geosci/ (http://www.ndsu.edu/geosci/)
- **Credential Offered:**
  UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/gis-remote-sensing/ (http://catalog.ndsu.edu/programs-study/undergraduate/gis-remote-sensing/)

Certificate Requirements

Certificate: GIS and Remote Sensing

Minimum Credits: 13

Code	Title	Credits
GEOG 455	Introduction to Geographic Information Systems	4
GEOG 470	Remote Sensing	3
Select two classes from the following:		6

GEOG 456	Advanced Geographic Information Systems
GEOG 465	Remote Sensing of the Environment
GEOG 480	Geographic Information Systems Pattern Analysis and Modeling
Total Credits	**13**

Global Business

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  Major (secondary major only)
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/global-business/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/global-business/)

Global Business is offered as a second major program of study only. This second major combines global business courses with language training and a study abroad experience to qualify students for management positions in the diverse, multicultural, and global environment they will encounter in the future. A second major in Global Business serves as a competence and skill amplifier for business students, complimenting their primary business major (i.e., accounting, business administration, finance, management, marketing, management information systems, and supply chain management). Students with this second major distinguish themselves in ways that they develop functional competencies from their primary business major and are prepared to lead and perform in multicultural and global business contexts through their second major. The Global Business major enhances students' ability to operate in global business environments, appreciation for different cultures, and business knowledge pertaining to international arenas.

BACKGROUND INFORMATION

The Association to Advance Collegiate Schools of Business (AACSB International) accredits the undergraduate and graduate programs in the College of Business at North Dakota State University. Our College of Business is one of only two AACSB-accredited schools of business in North Dakota.

AACSB International is one of higher education's most prestigious and rigorous accrediting bodies, emphasizing a commitment to continuous improvement, innovation, engagement, and impact in business education. Less than 10 percent of business programs worldwide have this accreditation, highlighting the academic excellence of our College of Business at NDSU.

THE PROGRAM

Global Business is a second major, which may only be added to a primary major from the College of Business (i.e., accounting, business administration, finance, management, marketing, management information systems, or supply chain management). The curriculum of this major is designed to prepare students to survive and thrive in today's global and multicultural work environment. This is achieved through global learning, both in the domestic classroom and through study abroad opportunities around the world. The focus is to help develop more globally minded students who can communicate effectively across cultures, who are more open to diversity, who become more inter-culturally proficient, and who are aware of business issues in the international arena. The global business second major requires students to have at least 3 credits of study abroad and 2nd–year language proficiency in addition to a group of internationally oriented business electives. To complete the program requirements of Global Business as a second major, students need to complete the requirements of both the global business major and their primary business major.

SELECTIVE ADMISSION

Students who wish to study global business at NDSU enroll as pre-major students of their primary major in the College of Business for the first semester of their first year. Admission to the major requires the successful completion of the pre-major course requirements (ENGL 120, COMM 110, MATH 144, ECON 201 or 202, and PSYC 111 or SOC 110) and a minimum cumulative grade point average (GPA) of 2.50, and declare Global Business as their second major. Transfer students may also be eligible for immediate admission in the major. Contact a College of Business professional advisor for more information.

THE FACULTY

To provide a rigorous and relevant educational experience to our students, faculty in our program are highly qualified to teach in their respective areas of expertise. Our faculty have been recognized for their teaching excellence by their students and colleagues and for their outstanding research by their peers. They employ a wide variety of instructional techniques and embed both classical and cutting-edge knowledge into their classes. They remain current in their fields by actively engaging in research and/or with firms and business professionals regarding their business practice, challenges, and issues.

THE PRACTICUM

Students are encouraged to complete practicum experiences, ideally at the end of sophomore and junior years. The practicum is designed to enable our students to connect business concepts learned in the classroom with live business situations and to broaden their horizons beyond the classroom setting. The practicum also gives students a competitive edge in job placement.

CAREER OPPORTUNITIES

Graduates with a second major in global business, in addition to their primary business major (i.e., accounting, business administration, finance, management, marketing, management information systems, or supply chain management), have career opportunities in business, industry, government service, and the non-profit sector, both regionally and globally. Initial employment opportunities are likely tied to their primary business major with global business competencies serving as their distinctive career enhancer.

THE COLLEGE

In addition to the global business major, the College of Business offers undergraduate majors in accounting, business administration, finance, management, marketing, management information systems, and supply chain management, as well as several minor and certificate opportunities. Full details about minors and certificate programs can be found at https://www.ndsu.edu/business/programs/undergraduate/. The College of Business also offers six graduate programs including Master of Business Administration, MBA in Agribusiness, Master of Accountancy, Master of Science in Business Analytics, Master of Supply Chain Management, and a Doctorate in Transportation and Logistics, as well as several graduate certificate programs. Full details about graduate certificate programs can be found at https://www.ndsu.edu/business/programs/graduate/graduate_certificates/.

HIGH SCHOOL PREPARATION

It is recommended that high school students interested in studying global business at the university level take mathematics courses at least through pre-calculus. High school electives in the social sciences, communication, foreign languages, and English also would be beneficial. Students who have satisfactorily completed Advanced Placement courses in Calculus, Economics, English, Communication, and Psychology or Sociology may directly apply for admission to the major. Please speak with a professional advisor in the College of Business for more information.

Global Business

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  Major (secondary major only)
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/global-business/ (http://catalog.ndsu.edu/programs-study/undergraduate/global-business/)

Secondary 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 major programs of Accounting, Business Administration, Finance, Management, Management Information Systems, or Marketing (see admission requirements (https://www.ndsu.edu/business/) for *all* College of Business majors).

II. Core Requirement

Code	Title	Credits
I. Core Requirement		
FIN 320	Principles of Finance	3
MGMT 320	Foundations of Management	3
MRKT 320	Foundations of Marketing	3
MIS 320	Management Information Systems	3
BUSN 430	Legal and Social Environment of Business	3
BUSN 340	International Business	3
BUSN 489	Strategic Management	3
Complete 3 courses from the following:		9

MRKT 372	Global Retailing	
MGMT 440	International Management	
FIN 440	International Finance	
MRKT 440	International Marketing	
BUSN 440	International Business Law	
ENTR 440	International Entrepreneurship	
AGEC 371	Export Management	
II. Language Proficiency Requirement [1]		3-14
III. Study Abroad Requirement [2 & 3]		
BUSN 341	Global Business Environment	3
or BUSN 379	Global Seminar	
or BUSN 394	Individual Study	
or BUSN 492	Global Practicum: Study Abroad	
or UNIV 492		
Total Credits		**36-47**

1

A second year, college-level language proficiency 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.
The second year, college-level language proficiency courses include:
(Prefix) 101: First Year Language I
(Prefix) 102: First Year Language II
(Prefix) 201: Second Year Language I
(Prefix) 202: Second Year Language II

2

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, a student may take a Study Tour (Prefix 379) which is an NDSU faculty directed experience or field study in a foreign country, or BUSN 394: Individual Study (Global Business Environment) or BUSN or UNIV 492. If students complete a BUSN/UNIV 492 study abroad experience, which requires the student to study abroad for at least 12 weeks at an international institution, as part of this experience, at least one course must be approved by business faculty to satisfy 3 credits. A substitution form will be necessary to file the study abroad credit with the Office of Registration and Records.

3

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 "Global Business Environment or equivalent study abroad course" in the program requirement.

Degree notes:

Course Suggestions: While not required, students are encouraged to take either ANTH 111 (Introduction to Anthropology) or COMM 216 (Intercultural Communication) as a general education cultural diversity requirement option. Students will also benefit from taking GEOG 161 (World Regional Geography) as an elective.

Global Studies

Department Information

- **Department Web Site:**
  www.ndsu.edu/spanish_globalstudies/ (http://www.ndsu.edu/spanish_globalstudies/)
- **Credential Offered:**
  Major; Minor; UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/global-studies/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/global-studies/)

In NDSU's Global Studies program, students engage critically with global issues and hone intercultural communication skills essential to navigating a global marketplace. This interdisciplinary major combines a set of required core courses and a flexible range of electives from disciplines such as

economics, geography, anthropology, history, philosophy, English, Spanish, political science, religion, and sociology. These electives are designed to educate students in the complexity of the numerous cultural, political, social, and economical interactions that comprise our modern world.

Major

The Global Studies major can be a primary or secondary major. Students seeking the Global Studies major are required to take courses that have a global focus. These include a 15-credit core and 12 credits of electives that will be chosen with the help of the student's adviser. Work, internships, or study abroad experience, as well as an integrative senior project that ties international study to the primary degree is also required.

Minor

The Global Studies minor provides students the opportunity to globalize their major as well, but on a less intensive level. It requires 18 credits of study.

Certificate

A certificate in Global Studies provides students a path to complete general education courses for humanities and social studies. It requires 10 credits of study.

Languages

For the Global Studies major, students must complete two courses at any level of any foreign language. This requirement may be completed at NDSU or while completing the study abroad requirement. Foreign language credits are optional for the Global Studies minor.

Experience Abroad

An important part of the Global Studies major is participation in a study, work, internship, or research experience abroad for at least 8 consecutive weeks in duration. The experience abroad must be pre-approved by the Global Studies adviser. Assistance with finding an overseas study program is available in the Office of International Programs (https://www.ndsu.edu/international/). Study abroad is optional for the Global Studies minor.

Admission

To be eligible to participate in the Global Studies major, students must have a minimum cumulative grade-point average of 2.0. Additional information about the Global Studies major and curriculum requirements are available through the Spanish and Global Studies webpage :https://www.ndsu.edu/spanish_globalstudies/

Global Studies

Department Information

- **Department Web Site:**
  www.ndsu.edu/spanish_globalstudies/ (http://www.ndsu.edu/spanish_globalstudies/)
- **Credential Offered:**
  B.S.; Minor; UG Certificate
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/global-studies/ (http://catalog.ndsu.edu/programs-study/undergraduate/global-studies/)

Major Requirements

Major: Global Studies

Minimum Required Credits: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

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Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Code	Title	Credits
Global Studies Core Requirements		
INTL 110	Introduction to Global Studies	3
GLBL 330: GLOBALIZATION AND THE DIGITAL AGE		3
GLBL 491: SEMINAR	(or any GLBL prefix course at the 400 level)	3
POLS 220	International Politics	3
or SOC 116	Global Social Problems	
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	3
Major Electives [1]		
Students will develop a plan of study from the courses listed below for a total of 12 major elective credits. Courses are categorized within focus/topic areas. Students must plan these 12 elective credits as follows:		12
1) A minimum of 2 different course prefixes;		
2) No more than 6 credits per prefix;		
3) No more than 3 credits of lower division (100-and 200-level) coursework.		
WORLD ECONOMICS AND POLITICS:		
POLS 120	Terrorism	
POLS 225	Comparative Politics	
POLS 240	Political Ideologies	
POLS 442	Global Policy Issues	
POLS 444	International Law	
POLS 445	Ethnic Conflicts	
POLS 446	International Criminal Law	
POLS 450	Politics of the Developing Countries	
POLS 451	Politics of the Industrialized Countries	
POLS 452	Comparative Political Economy	
POLS 454	Comparative Democratic Institutions	
ECON 356	History of Economic Thought	
ECON 461	Economic Development	
ECON 472	International Trade	
ECON 482	Environmental Economics	

INTL 401	Life and Politics of US-Mexico Borderlands
SPAN 301	Spanish for Business
PHIL 216	Business Ethics
WORLD CULTURES AND ENVIRONMENT	
ANTH 111	Introduction to Anthropology
ANTH 446	Anthropology of Latin America
ANTH 453	Magic and Religion
ANTH 455	Language and Expressive Culture
ANTH 478	History and Cultures of the Caribbean
ANTH 480	Development of Anthropological Theory
TIPS 101	Introduction to Native American & Indigenous Studies
HDFS 275	Diversity and Multiculturalism in Individual and Family Life
COMM 216	Intercultural Communication
SOC 235	Cultural Diversity
SOC 431	Environmental Sociology
SPAN 330	Introduction to Spanish Civilization
SPAN 331	Introduction to Spanish American Civilization
PLSC 110	World Food Crops
BIOL 124	Environmental Science
GEOG 151	Human Geography
GEOG 161	World Regional Geography
GEOL 300	Environmental Geology
NRM 225	Natural Resources & Agrosystems
EMGT 325	
EMGT 345	
WORLD HISTORY AND LITERATURES	
ART 111	Introduction to Art History
ART 210	Art History I
ART 211	Art History II
ENGL 209	Introduction to Linguistics
ENGL 240	World Literature Masterpieces
ENGL 330	Women's Writing
ENGL 335	Multicultural Writers
ENGL 455	International Technical Writing
HIST 175	Pirates of the Caribbean
HIST 259	Women in European History 1400-1800
HIST 271	Introduction to Latin American History
HIST 280	History of East Asia to 1600
HIST 281	History of East Asia from 1600
HIST 381	Australia & New Zealand
HIST 435	World Environmental History
HIST 440	The Ottoman Empire
HIST 451	Medieval History
HIST 456	Europe 1815-1914
HIST 457	Europe Since 1914
HIST 464	Imperial Spain
HIST 465	Germany since 1750
HIST 466	History Of Russia I
HIST 467	History Of Russia II
HIST 473	Colonial Mexico
HIST 474	Modern Mexico
HIST 475	The Aztec, Maya, and Inca

HIST 477	Slavery in the Atlantic World	
HIST 480	History of Modern China from 1600	
HIST 481	History of Japan	
HIST 482	Vietnam: 125 Years of Conflict	
HIST 485	Cultural Exchange and the Making of the Modern World	
HIST 486	Plague! Tragedies and Triumphs of Globalization	
SPAN 332	Introduction to Hispanic Cinema	
SPAN 440	Traditions in Spanish American Literature	
SPAN 441	Contemporary Spanish American Literature	
SPAN 442	Introduction to Chicano Literature	
SPAN 443	Spanish American Women Writers	
SPAN 450	Traditions in Spanish Literature	
SPAN 451	Contemporary Spanish Literature	
SPAN 453	Spanish Women Writers	
PHIL 215	Contemporary Moral Issues	
PHIL 221	Indian Philosophical Tradition	
RELS 100	World Religions	
RELS 355	Global Islam	
RELS 453	Magic And Religion	
THEA 115	World Film	
THEA 280	World Theatre	
WGS 370	Transnational/Global Women	
ADDITIONAL OPTIONS: No more than 3 credits from the following may be used toward the 12 credits of major electives.		
GLBL 397: Global Internship		
GLBL 492: Study Abroad		
(Prefix) X79: Global Seminar		
Foreign Language Requirement		
Two courses of any foreign language at any level required		6-8
Study Abroad Experience: Study Abroad, Work Experience Abroad, or Research Experience Abroad Requirement		
A minimum of an 8-week experience abroad is required for a minimum of 3 credits. Student earning more credits while studying abroad may count these additional study abroad credits toward the major electives or the language requirements.		3
Integrative Senior Project Requirement		
GLBL: 411 GLOBAL LEARNING	(Three one credit courses required for this requirement.)	3
Total Credits		**39-41**

1

Other courses not listed within this section that have a significant global emphasis may also qualify but must be approved in advance and a substitution/waiver form will need to be filed by the department with Registration and Records to count toward the major.

Minor Requirements

Minor: Global Studies

Required Credits: 18

Code	Title	Credits
Core Requirement		
INTL 110	Introduction to Global Studies	3
GLBL 330: GLOBALIZATION AND THE DIGITAL AGE		3
or GLBL PREFIX COURSE AT GLBL PREFIX COURSE 300/400 LEVEL		
Select 2 courses from the following:		6
RELS 100	World Religions	
or RELS 355	Global Islam	

SOC 116	Global Social Problems
GEOG 161	World Regional Geography
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World
POLS 220	International Politics
POLS 225	Comparative Politics
SPAN 101	First-Year Spanish I
SPAN 102	First-Year Spanish II
SPAN 201	Second-Year Spanish I
SPAN 202	Second-Year Spanish II

Minor Electives [1]

Select from the courses listed:	6
WORLD ECONOMICS AND POLITICS:	
POLS 110	Introduction to Political Science
POLS 120	Terrorism
POLS 220	International Politics
POLS 240	Political Ideologies
POLS 225	Comparative Politics
POLS 442	Global Policy Issues
POLS 444	International Law
POLS 445	Ethnic Conflicts
POLS 446	International Criminal Law
POLS 450	Politics of the Developing Countries
POLS 451	Politics of the Industrialized Countries
POLS 452	Comparative Political Economy
POLS 454	Comparative Democratic Institutions
ECON 356	History of Economic Thought
ECON 461	Economic Development
ECON 472	International Trade
H&CE 445	Designing and Delivering Nonformal Education Programs
ECON 482	Environmental Economics
INTL 401	Life and Politics of US-Mexico Borderlands
SPAN 301	Spanish for Business
PHIL 216	Business Ethics
WORLD CULTURES AND ENVIRONMENT:	
ANTH 111	Introduction to Anthropology
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World (If not taken in the core.)
ANTH 446	Anthropology of Latin America
ANTH 453	Magic and Religion
ANTH 455	Language and Expressive Culture
ANTH 480	Development of Anthropological Theory
TIPS 101	Introduction to Native American & Indigenous Studies
HDFS 275	Diversity and Multiculturalism in Individual and Family Life
COMM 216	Intercultural Communication
SOC 116	Global Social Problems (If not taken in the core.)
SOC 431	Environmental Sociology
SPAN 330	Introduction to Spanish Civilization
SPAN 331	Introduction to Spanish American Civilization
PLSC 110	World Food Crops
BIOL 124	Environmental Science
GEOG 151	Human Geography
GEOG 161	World Regional Geography (If not taken in the core.)
GEOL 300	Environmental Geology

NRM 225	Natural Resources & Agrosystems
EMGT 325	
EMGT 345	
WORLD HISTORY AND LITERATURES	
ART 111	Introduction to Art History
ART 210	Art History I
ART 211	Art History II
ENGL 209	Introduction to Linguistics
ENGL 240	World Literature Masterpieces
ENGL 330	Women's Writing
ENGL 335	Multicultural Writers
ENGL 455	International Technical Writing
HIST 175	Pirates of the Caribbean
HIST 259	Women in European History 1400-1800
HIST 271	Introduction to Latin American History
HIST 280	History of East Asia to 1600
HIST 281	History of East Asia from 1600
HIST 381	Australia & New Zealand
HIST 435	World Environmental History
HIST 440	The Ottoman Empire
HIST 451	Medieval History
HIST 456	Europe 1815-1914
HIST 457	Europe Since 1914
HIST 464	Imperial Spain
HIST 465	Germany since 1750
HIST 466	History Of Russia I
HIST 467	History Of Russia II
HIST 473	Colonial Mexico
HIST 474	Modern Mexico
HIST 475	The Aztec, Maya, and Inca
HIST 477	Slavery in the Atlantic World
HIST 480	History of Modern China from 1600
HIST 481	History of Japan
HIST 482	Vietnam: 125 Years of Conflict
HIST 485	Cultural Exchange and the Making of the Modern World
HIST 486	Plague! Tragedies and Triumphs of Globalization
SPAN 332	Introduction to Hispanic Cinema
SPAN 440	Traditions in Spanish American Literature
SPAN 441	Contemporary Spanish American Literature
SPAN 442	Introduction to Chicano Literature
SPAN 443	Spanish American Women Writers
SPAN 450	Traditions in Spanish Literature
SPAN 451	Contemporary Spanish Literature
SPAN 453	Spanish Women Writers
PHIL 215	Contemporary Moral Issues
PHIL 221	Indian Philosophical Tradition
RELS 100	World Religions (If not take in the core.)
RELS 355	Global Islam (If not taken in the core.)
RELS 453	Magic And Religion
THEA 115	World Film
THEA 280	World Theatre
WGS 370	Transnational/Global Women

Study/Work/Reseach Experience Abroad [2]	
Total Credits	**18**

1

Other courses, including credits earned while studying abroad, may be approved for this area by the Director of the Global Studies major; a substitution form must be submitted to the Office of Registration and Records signed by the dept. chairperson will be required in these instances.

2

Completion of a study abroad program is optional for the minor. If a student completes study abroad, the study abroad credit is eligible to count as electives for the minor when a substitution form signed by the dept. chairperson is submitted to the Office of Registration and Records.

Certificate Requirements

Global Studies

Required Credits: 10

Code	Title	Credits
Required Courses		
SPAN 101	First-Year Spanish I	4
INTL 110	Introduction to Global Studies	3
Select one course from the following:		3
SPAN 102	First-Year Spanish II (if student is needing humanities credits)	
RELS 100	World Religions (if student is needing humanities credits)	
SOC 116	Global Social Problems (if student is needing social science credit)	
POLS 220	International Politics (if student is needing social science credit)	
Total Credits		**10**

Health Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/health-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/health-education/)

The health education major is designed to prepare students for careers in the field of school health education through the development of dispositions, knowledge and skills. The program integrates classroom and experiential community-based learning throughout its courses.

The Program

The health education program emphasizes a student-centered approach to teaching health, emphasizing skills-based learning to promote health literacy for all individual students.

Upon completion of the health education major, teacher candidates will be knowledgeable with planning, implementing, administering all ten components of the Whole School, Whole Community, Whole Child Model. Health education teacher candidates will learn how to evaluate and assess needs for health education, plan and implement quality curriculum and lessons and communicate and advocate for health and health education through all ten content components. Candidates in the health education major are prepared to teach health to students in grades 5-12 and 7-12 with creativity and confidence.

Professional Education Courses

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

Student Teaching

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

Student Advisement

An academic advisor works individually with health education teacher candidates to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to seek their advisor's help whenever needed.

Licensure

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

Career Opportunities

Graduates in health education find career opportunities teaching health education in a variety of public and private educational settings, including K-12 schools, community programming, nonprofit organizations and private businesses.

Double Major – It is recommended that health education teacher candidates obtain a degree enhancement through a minor or double major. The health education curriculum has been structured to allow teacher candidates to obtain a physical education major during the same four-year time frame. Advisors can provide additional information about other complementary majors or minors.

Physical Education Major – For further information about the physical education major, please refer to: https://catalog.ndsu.edu/programs-study/undergraduate/physical-education/.

Sample Program Guide - HE Major

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	3	ENGL 120	3
HPER 110*	3	EDUC 321	3
PSYC 111	3	HPER 217*	3
Gen Ed Hum/Fine Arts & Cultural Diversity *	3	Gen Ed Science/Tech	3
Gen Ed Quantitative Reasoning	3	Free Elective	3
	15		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	HPER 341*	3
EDUC 322	3	HNES 250**	3
Gen Ed Hum/Fine Arts & Global Perspective	3	PSYC 210**	3
Gen Ed Science/Tech w/ Lab	4	PSYC 250 or HDFS 230**	3
Free Elective	3	Free Elective	3
Complete Core Academic Skills Exam or access your ACT+ scores			
Apply to the School of Education			
	16		**15**

Third Year					
Fall	**Credits**		**Spring**	**Credits**	
HPER 367*		3	EDUC 489		3
PSYC 212**		3	EDUC 451		3
Gen Ed Science/Tech		3	HPER 345*		3
Free Electives		6	Gen Ed Upper Division Writing		3
			Free Elective		3
		15			**15**
Fourth Year					
Fall	**Credits**		**Spring**	**Credits**	
EDUC 481 (Health Section)**		3	EDUC 485		1
EDUC 486		3	EDUC 487		9
Free Electives		10	EDUC 488		3
Apply for Student Teaching					
Complete PLT (grades 7-12) Exam					
Complete Subject Area Assessment Exam					
		16			**13**

Total Credits: 120

*
Students must earn a "B" or better in all courses identified with an asterisk (*).

**
Students must earn a grade of "C" or better in all course identified with a double asterisk (**).

Sample Program Guide - Health Education & Physical Education Double Major

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year					
Fall	**Credits**		**Spring**	**Credits**	
ENGL 110		3	EDUC 321		3
HPER 110*		3	ENGL 120		3
HPER 255*		3	Gen Ed Science & Tech w/ Lab		4
PSYC 111		3	Gen Ed Quantitative Reasoning		3
Gen Ed Science/Tech		3	Gen Ed Hum/Fine Arts & Cultural Diversity		3
		15			**16**
Second Year					
Fall	**Credits**		**Spring**	**Credits**	
COMM 110		3	HPER 217, HNES 100, or HNES 111*		3
EDUC 322		3	HPER 257*		3
HPER 211		1	HPER 341*		3
HPER 254*		3	HNES 250***		3
HPER 256*		3	PSYC 210***		3

Gen Ed Hum/Fine Arts & Global Perspectives	3	Gen Ed Science & Tech	3
Complete Core Academic Skills Exam or access your ACT+ scores			
	16		**18**

Third Year			
Fall	**Credits**	**Spring**	**Credits**
PSYC 212***	3	EDUC 489	3
HPER 301**	3	HPER 345*	3
HPER 336**	3	HPER 350*	3
HPER 367**	3	HPER 353*	3
EDUC 451 (PE section)*	3	Gen Ed Upper Division Writing	3
	15		**15**

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 481 (Health Section)***	3	EDUC 485	1
EDUC 481 (PE Section)***	3	EDUC 487	9
EDUC 486	3	EDUC 488	3
PSYC 250 or HDFS 230**	3		
HPER 461*	3		
Apply for Student Teaching			
Complete PLT (grades K-12) Exam			
Complete Subject Area Assessment Exam			
	15		**13**

Total Credits: 123

*
Students are required to earn a "B" or better in these courses, but may earn one "C" among the three courses marked with two asterisks (**).

***
Students are required to earn a "C" or better in courses marked with three asterisks (***)

Health Education

Department Information

- **Department Web Site:**
  www/ndsu.edu/education/ (http://www/ndsu.edu/education/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/health-education/ (http://catalog.ndsu.edu/programs-study/undergraduate/health-education/)

Major Requirements

Major: Health Education

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.

3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Health Education Requirements		
HDFS 230	Life Span Development **	3
or PSYC 250	Developmental Psychology	
HPER 217	Personal and Community Health *	3
PSYC 111	Introduction to Psychology	3
Teaching Specialty Requirements		
HPER 110	Introduction to Health and Physical Education *	3
HNES 250	Nutrition Science **	3
HPER 341	Psychosocial Aspects of Health *	3
HPER 345	Materials and Concepts of Health Education *	3
HPER 367	Pedagogy of the Body for K-12	3
PSYC 210	Human Sexuality **	3
PSYC 212	Psychological Aspects of Drug Use and Abuse **	3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Health Ed K-12) **	3
EDUC 485	Student Teaching Seminar	1

EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		**61**

*
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

- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.
- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- See School of Education (https://www.ndsu.edu/education/) for admission requirements.

Health Services

Department Information

- **Department Web Site:**
  www.ndsu.edu/publichealth/ (http://www.ndsu.edu/publichealth/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/health-services/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/health-services/)

The Bachelor of Science in Health Services (BSHS) includes a mix of academic and experiential training that meets the needs of public health and healthcare-related employers. The degree is designed to provide an efficient and flexible four-year degree, which allows students to pursue entry-level employment in health-related settings and/or prepare for graduate/advanced professional-level training programs.

The Program

The BSHS program has broad requirements, and allows students flexibility to tailor their plan of study to meet their unique career interests. The core courses provide students an introduction to medical terminology, human disease, public health, the US healthcare system, health services research, and professional ethics. In addition to core courses, BSHS students are required to declare a public health minor, a business administration minor, or be admitted to an accelerated BS-MPH program.

Students are required to meet with their academic advisor to create a plan of study that addresses all program requirements. The plan must be approved by the BSHS Academic Coordinator.

Experiential Training

A core element of the BSHS degree is that students gain hands on learning experiences that prepare them for their own, unique health care career. Students must complete at least 10 credits of approved field experience, although students are highly encouraged to complete additional experiential credits. These experiences may be based in research, clinical work, or general internships. Students may complete field experience credits through NDSU or local health and public health settings.

While students have tremendous flexibility in selecting their field experience, each site may have additional requirements to complete those credits. Students must meet with their academic advisor to ensure that all academic prerequisites and professional requirements necessary to enroll in their intended field experience credits courses are met.

Transferring Credits

View NDSU equivalencies of transfer courses at: www.ndsu.edu/transfer/equivalencies (http://www.ndsu.edu/transfer/equivalencies/)

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as,

but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
PH 190		3	PH 101	3
ENGL 110		3	PHRM 170	2
Gen Ed Science & Tech w/ Lab		4	ENGL 120	3
Gen Ed Humanities/Fine Arts & Glob Persp		3	Gen Ed Social & Behavioral Sciences	3
Math Placement or Free Elective[1]		3	Gen Ed Science & Tech	3
			Free Elective	3
		16		**17**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
PHIL 111		3	ASCI 125	1
Gen Ed Science & Tech		3	COMM 110	3
Gen Ed Humanities & Fine Arts		3	Gen Ed Social/Behavioral Sci & Cult Div	3
Gen Ed Social & Behavioral Sci		3	Free Elective or Major Option Course	3
Free Elective or Major Option Course		3	Free Elective or Major Option Course	3
			Free Elective or Major Option Course	3
		15		**16**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
PH 300		3	PH 301[2]	3
ENGL 325		3	Free Elective or Major Option Course	3
STAT 330[1,2]		3	Free Elective or Major Option Course	3
Free Elective or Major Option Course		3	Free Elective or Major Option Course	3
Free Elective or Major Option Course		3	Free Elective or Major Option Course	3
		15		**15**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
PH 496		5	PH 489	1
Free Elective or Major Option Course		3	PH 496	5
Free Elective or Major Option Course		3	Free Elective or Major Option Course	3
Free Elective or Major Option Course		3	Free Elective or Major Option Course	3
		14		**12**

Total Credits: 120

1

STAT 330 requires a math pre-requisite. MATH 103, MATH 104, or MATH 107, OR math placement into MATH 105, MATH 146, or MATH 165.

2

PH 301 pre-requisites: STAT 330 with a grade of C or higher, and junior or senior standing.

Degree Note:

- A grade of C or better is required for all major coursework.

Health Services

Department Information

- **Department Web Site:**
  www.ndsu.edu/publichealth/ (http://www.ndsu.edu/publichealth/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/health-services/ (http://catalog.ndsu.edu/programs-study/undergraduate/health-services/)

Major Requirements

Major: Health Services

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Health Services Core Requirement		
ASCI 125	Medical Terminology for Health Professionals [1]	1
ENGL 325	Writing in the Health Professions [1]	3
PHRM 170	Common Diseases, Prevention, and Treatment [1]	2
PHIL 111	Professional Responsibility and Ethics [1]	3
PH 101	Introduction to Public Health [1]	3
PH 190	Critical Thinking, Academic, and Professional Skills for the Health Professions [1]	3
PH 300	Introduction to the U.S. Health Care System [1]	3
PH 301	Research Methods in Health Services [1]	3
PH 489	Health Services Capstone [1]	1
Field Experience [1]		
PH 496:Field Experience (Clinical, Research, or Internship Requirements) [2]		10
Major Options [1]		
Students will need to select one of the options listed below to complete the requirements for the major. Options range in credit total from 14 to 24 depending on the option selected.		14-24
Total Credits		**46-56**

Public Health Minor Option

Code	Title	Credits
Public Health Minor Requirements [1]		
Students will need to officially declare the Public Health minor and they should refer to the official minor curriculum guide for course requirements.		20
Total Credits		**20**

Business Administration Minor Option

Code	Title	Credits
Business Administration Minor Requirements [1]		
Students will need to officially declare the Business Administration minor and they should refer to the official minor curriculum guide for course requirements. The minimum GPA of 2.50 for the courses included in this minor will also apply.		24
Total Credits		**24**

Master of Public Health in Community Health Services Option

Code	Title	Credits
Master of Public Health - Community Health Sciences [1,3]		
PH 675	One Health	2
PH 704	Public Health Management and Policy	3
PH 706	Essentials of Epidemiology	3
PH 711	Integrating Primary Care and Public Health	3
PH 741	Social and Behavioral Sciences in Public Health	3
Total Credits		**14**

Master of Public Health in Epidemiology Option

Code	Title	Credits
Master of Public Health - Epidemiology [1,3]		
PH 675	One Health	2
PH 704	Public Health Management and Policy	3
PH 706	Essentials of Epidemiology	3
PH 712	Public Health Research Methods	3
PH 741	Social and Behavioral Sciences in Public Health	3
Total Credits		**14**

1

A grade of C or better is required in all coursework for the BS in Health Services.

2

All core courses must be completed before a student will be eligible to register for Field Experience.

3

Students in the MPH accelerated program must also maintain a cumulative GPA of 3.0.

History

Department Information

- **Department Web Site:**
  www.ndsu.edu/history/ (http://www.ndsu.edu/history/)
- **Credential Offered:**
  B.A.; B.S.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/history/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/history/)

The formal study of history dates to ancient Greece, yet the discipline has never been more relevant. Understanding the modern world requires a clear understanding of what has come before, especially in today's fractured and turbulent era. Studying history provides students with the critical thinking, analytical, and research skills to evaluate sources of information, engage in civil debate, make persuasive arguments, and contribute as productive citizens of their nation and the world. An undergraduate degree in History prepares students for careers in government, the law, public service, teaching, and business, as well as providing a foundation for graduate study in any number of fields.

The Program

Students can earn a BA, BS, or Minor in History at NDSU. There are also opportunities to major in Public History (https://www.ndsu.edu/history/history/public_history/), History Education (https://www.ndsu.edu/programs/undergraduate/history-education/), and Social Science Education (https://www.ndsu.edu/programs/undergraduate/social-science-education/).

History major students take 39 credits in History courses in addition to University and College General Education requirements. 9 credits are devoted to foundational courses at the 100- or 200-level, which introduce students to basic content in a variety of historical sub-fields, as well as skills such as analyzing primary and secondary sources, asking informed questions about the past, and engaging in informed discussion and debate with their classmates. Students then take 18 credits of 300- or 400-level courses, distributed among North American History, European History, and Widening Horizons categories. These courses expose students to cutting-edge historical scholarship in each of these fields, while building writing, research, and discussion skills.

In their sophomore or junior year, students take Historical Research and Writing, which trains them to write persuasive, evidence-based, and clear arguments about the past. As a capstone experience, in their senior year History major students apply these skills in a semester-long writing seminar, where they produce an original research paper on a topic of their choice. The remaining 6 credits are electives that allow students to follow their own intellectual interests within the History curriculum. A listing of regularly offered courses can be found here (https://catalog.ndsu.edu/course-catalog/descriptions/hist/).

History Minors (https://catalog.ndsu.edu/undergraduate/program-curriculum/history/#minortext) take 9 History credits at the 100- or 200-level and 9 credits at the 300- or 400-level.

Learning Outcomes

Upon completion of the History major, students will be able to:

1) Employ historical thinking and empathy as central to engaged citizenship;

2) Analyze multiple viewpoints and perspectives about the past;

3) Explain and analyze the complexity of human experiences outside the western world in time and space;

4) Ask questions about the past, mindful of historical contexts; and

5) Craft a historical narrative and an argument that is reasoned and based on historical evidence in appropriate primary and secondary sources.

Faculty

The NDSU history faculty consists of internationally-recognized researchers and teachers, several of whom have won national and University awards for their research and pedagogy. Areas of strength include North American History from the colonial period through the 20th Century, the Great Plains,

Public History, Women's History, 20th-Century Southeast Asia, Medieval and Early Modern Europe, the Cold War in Eastern Europe, Colonial Latin America, and the History of Religion. Each faculty member has published at least one scholarly book in their area of expertise, and all regularly publish articles and present research papers at professional conferences. The department also regularly hosts regional and national history conferences and participates in colloquia and public-facing events. Find more on faculty teaching, research, and outreach activities here (https://www.ndsu.edu/history/faculty_and_staff/).

Study Abroad

The history faculty regularly lead study-abroad courses and are committed to expanding students' horizons at the international level. Recent and upcoming courses and destinations include the Hapsburg Empire in Vienna, European Religious Traditions in Rome, World War II in London and Paris, Japanese History and Culture in Japan, and the Early Modern Spanish Empire in Spain.

Cultural Diversity

The department is strongly committed to helping students understand the diversity of human experience. History classes help students understand how differences in race, gender, ethnicity, and social and economic class have affected people's lives and influenced the modern world. Department faculty are also active in numerous efforts to promote understanding of diversity.

Public History

In 1982, NDSU launched the first public history program in the Upper Midwest. Public History is a vibrant field of study that trains students to work in archives, museums, historical societies and sites, historic preservation, historical editing, digital history and documentary film-making, and areas of the Federal Government such as the National Park Service. Public History is a professional major that can be easily combined with a History major or minor. More information can be found here (https://www.ndsu.edu/history/history/public_history/#:~:text=At%20NDSU%20a%20BA%20or,public%20history%20are%20also%20required).

Institute for Regional Studies

The North Dakota Institute for Regional Studies (https://www.ndsu.edu/ahss/about/nd_institute_for_regional_studies/) has close connections with the History program. The Institute collects, organizes and preserves materials on our region's historical heritage.

Humanities North Dakota

History faculty are active in programs sponsored and funded by Humanities North Dakota (https://www.humanitiesnd.org/). In recent years, faculty have conducted grant-supported research, written books and articles, and delivered public presentations on North Dakota women's participation in the National Women's Conference of 1977, genocide in Bosnia, suicide and divorce in the Civil War South, the Dakota War of 1862, and French Colonial policies in Indochina.

Phi Alpha Theta

The NDSU History faculty sponsor a local chapter of Phi Alpha Theta (https://phialphatheta.org/), the History Honors Society, and NDSU students regularly present research papers at the Society's regional and national conferences. The department holds an annual initiation ceremony in April and several social events throughout the year for PAT members. Students with at least 12 credit hours in history with a History GPA of 3.1 or above are eligible to apply for membership.

Career Opportunities

History is a versatile degree, and students regularly go on to careers in government, education, journalism, editing and publishing, public service, the law, and business. The skills fostered by historical study - persuasive argumentation, critical thinking, analysis of information sources, and research, to name a few - are well-suited to any number of careers, as evidenced by the number of history majors helming Fortune 500 companies, serving in government agencies, and making contributions in the fields of journalism, entertainment, law, and politics. Indeed, more US presidents -- including George W. Bush and Joe Biden -- have been history majors than any other undergraduate field of study.

The American Historical Association has compiled more detailed information on career paths for history majors, including profiles of recent graduates, here (https://www.historians.org/jobs-and-professional-development/career-resources/careers-for-students-of-history/).

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
HIST 100/200 Level		3	HIST 100/200 Level	3
ENGL 110		3	COMM 110	3
Gen Ed Social & Behavioral/Global Perspectives		3	ENGL 120	3
Gen Ed Quantitative Reasoning		3	Gen Ed Science & Technology w/ Lab	4
Gen Ed Wellness		2	Free Elective	3
		14		**16**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
HIST 100/200 Level		3	Gen Ed Science & Technology	3
AHSS College Humanities Requirement		3	300- or 400-level European HIST	3
Gen Ed Science & Technology		3	Gen Ed Humanities & Fine Arts	3
Gen Ed Social & Behavioral Sciences/Cult Diversity		3	Free Elective	6
300- or 400-level North American HIST		3		
		15		**15**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
HIST 390 (Gen Ed Upper Division Writing)		3	300- or 400-level European HIST	3
300- or 400-level North American HIST		3	300- or 400-level Widening Horizons HIST	3
300- or 400-level Widening Horizons HIST		3	Free Elective	9
Free Elective		6		
		15		**15**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
Required History Elective		3	HIST 489	3
Free Electives		12	Required History Elective	3
			Free Elective	9
		15		**15**

Total Credits: 120

Program Note:

- 4 credits must be taken at the 300-400 level and 20 credits must be taken in residence at NDSU for the history major.

History

Department Information

- **Department Web Site:**
  www.ndsu.edu/history/ (http://www.ndsu.edu/history/)
- **Credential Offered:**
  B.S.; B.A.; Minor

- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/history/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/history/#planofstudytext)

Major Requirements

Major: History

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Core Requirements		
HIST 1XX or 2XX level		3
HIST 1XX or 2XX level		3
HIST 1XX or 2XX level		3
HIST 390	Historical Research and Writing	3
HIST 489	Senior Seminar (Capstone) *	3
Additional History Electives		6

Distribution Requirement: Minimum credit required for each distribution area.		
North American History - Select 6 credits from the following:		6
RELS 340		
RELS 345	Church and State in America	
HIST 328	War and Society in America	
HIST 382		
HIST 415	Public Memory and Memorialization in America	
HIST 420	Colonial American History	
HIST 421	Revolutionary America	
HIST 422	American Civil War and Reconstruction	
HIST 423	The Gilded Age and Progressive America	
HIST 424	U.S. History 1917-1960	
HIST 425	U.S. History 1917-Present II	
HIST 426	Women in American History	
HIST 431	The North American Plains	
HIST 434	Environmental History	
HIST 436	American Frontier to 1850	
HIST 437		
European History - Select 6 credits of the following:		6
HIST 320	History of Christianity	
HIST 449	Ancient Rome: From Republic to Empire	
HIST 450	Ancient History	
HIST 451	Medieval History	
HIST 454	Renaissance And Reformation	
HIST 455		
HIST 456	Europe 1815-1914	
HIST 457	Europe Since 1914	
HIST 464	Imperial Spain	
HIST 465	Germany since 1750	
HIST 467	History Of Russia II	
Widening Horizons - Select 6 credits of the following:		6
HIST 355	Global Islam	
HIST 381	Australia & New Zealand (May satisfy general education category A and G)	
HIST 440	The Ottoman Empire	
HIST 473	Colonial Mexico	
HIST 474	Modern Mexico	
HIST 475	The Aztec, Maya, and Inca	
HIST 477	Slavery in the Atlantic World	
HIST 480	History of Modern China from 1600	
HIST 481	History of Japan	
HIST 482	Vietnam: 125 Years of Conflict	
HIST 484	Cultures and Civilizations of the Pre-modern World	
HIST 485	Cultural Exchange and the Making of the Modern World	
HIST 486	Plague! Tragedies and Triumphs of Globalization	
Total Credits		**39**

*

The prerequisite for HIST 489 Capstone is HIST 390.

Degree Requirements and Notes:

- Twenty-four (24) credits must be taken at the 300-400 level and of these 24, twenty (20) credits must be taken in residence at NDSU for a history major.

Minor Requirements

Minor: History

Required Credits: 18

Code	Title	Credits
Electives		
HIST	100-200 level courses	9
HIST	300-400 level courses	9
Total Credits		**18**

Minor Requirements and Notes

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

Horticulture and Urban Agriculture

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/plantsciences (http://www.ag.ndsu.edu/plantsciences/)
- **Credential Offered:**
  B.S.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/horticulture/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/horticulture/)

Horticulture is the art and science of producing, improving, marketing, and using fruits, vegetables, flowers, and landscape plants. It differs from botany and other plant sciences in that horticulture incorporates both science and art. Horticulture is an art as old as the ancient gardens and a science as new as today's genetic engineering. Horticulture is an entrepreneurial industry, profession, business, vocation and avocation. Production and consumption of high quality fruits and vegetables allows us to maintain a healthy, balanced daily diet. Flowers and ornamental plants enrich our homes and communities, and contribute to our sense of well-being. Horticulture impacts our lives on a daily basis by providing nutritious fruits and vegetables, offering visual enjoyment, and promoting recreational activities. Horticulture is a multibillion dollar industry made up of small businesses as well as large publicly traded enterprises.

The Program

The Department of Plant Sciences offers a four-year curriculum in horticulture leading to the Bachelor of Science degree. There are six horticulture options: horticulture science, landscape design, landscape management, production-business, sports and urban turfgrass management, and urban forestry and parks.

HORTICULTURE MINOR

The horticulture program offers a minor and is open to students in any major. The horticulture minor is geared toward students who want to learn more about plants and their many uses.

Career Opportunities

Production – producers of horticultural food crops for fresh consumption or processing; nursery and greenhouse production of food and ornamental crops; field positions for processing, marketing and seed companies; and plant propagation/tissue culture specialists. Salaries range from $45,000 - $80,000

Landscaping – planners, designers and installers of residential, commercial, public and recreational landscapes (both exterior and interior), employment with nurseries, landscape management and maintenance firms or private consultants. Salaries range from $45,000 - $80,000

Arborist or Urban Park Forester – selection, planting and management of woody plants in urban environments. Salaries range from $45,000 - $80,000

Park Management and Maintenance – positions in national, state and local park systems, botanic gardens and arboreta

Golf Course Superintendent – professional manager who manages the labor, time, materials and financial resources needed to care for the turfgrass and landscaped grounds on a golf course. Starting as an assistant, it is possible for a graduate to become a full-fledged golf course superintendent in three to five years. Starting salaries range from $28,000 to $35,000, with the national average of head superintendents reaching more than $80,000

Sports Turf Management – professional manager that is entrusted with the operation and management of sports fields and facilities. Sports fields include baseball, football, soccer, lacrosse, rugby, lawn bowling and cricket. Salaries average around $44,000.

Lawn Care Operator – professional manager responsible for the cultivation and care of the landscaping and grounds surrounding a business or building. Lawn care operators comprise the largest single group of potential career opportunities for the graduate with more than 6,000 companies in the United States servicing millions of American lawns at the residential, commercial and institutional levels. Salaries range from $45,000 - $80,000

Facility Managers – professional manager that maintains the buildings and grounds of an organization, directing staff and overseeing the upkeep of equipment and supplies. Facilities managers make sure the buildings and grounds are maintained, which entails daily and weekly reduction improvements and safety inspections

Marketing – positions in the retail/wholesale distribution of horticultural products and buying, selling and distribution of supplies and products used by the horticultural industries

Industry – management and sales positions in horticulture or allied firms for fertilizers, seed, food and ornamental crops, pesticides, equipment, processing and packaging

Inspection – field diagnosticians and inspectors for fresh and processed products in federal or private agencies

Research – positions at public and private institutions as technicians in field and laboratory research. Areas of research include horticultural plant breeding, pesticide evaluation, crop physiology, product testing and quality control, plant propagation and biotechnology

Communication – writers/editors for television, radio, magazines and newspapers

Teaching and Extension – extension personnel who assist growers, industry and the public through education and outreach

Financial Aid and Scholarships

Loans, scholarships, grants and the work-study program are available through the Office of Financial Aid and Scholarships. Students requiring financial assistance may contact the Office of Financial Aid and Scholarships or One Stop.

The Department of Plant Sciences awards 15 horticultural scholarships for use during the freshman, sophomore, junior and senior years. The Horticulture and Forestry Club awards three scholarships each year as well. Additionally, scholarships are awarded to freshmen students by the College of Agriculture, Food Systems, and Natural Resources prior to enrollment. Scholarships also are available to students continuing a major in the College. Applications for all college and departmental scholarships may be applied for online between December 1 and March 1, annually. Also, many undergraduate students are employed part-time during the school year and full-time during the summer months as research or teaching assistants.

Extra-Curricular Activities

Horticulture & Forestry Club – an opportunity for students who enjoy plants to come together and participate in fun plant related events including: collegiate contests, field trips and networking opportunities. The club meets at least monthly. Collegiate contests and exhibits provide educational and leadership opportunities. Field trips are made annually, exposing students to a diversity of horticultural enterprises and potential job opportunities. Club members propagate, grow and sell flowers and ornamental plants to finance social events, field trips and scholarships. Majors and non-majors are welcome!

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	ENGL 120	3
ENGL 110	3	CSCI 114 or TL 116	3
PLSC 189	1	MATH 104 or 103	3
PLSC 210	3	Major Option Elective	3
PLSC 211	1	Hum & Fine Arts and Cult Div Gen Ed	3
Free Elective	3		
	14		**15**

Second Year							
Fall	**Credits**		**Spring**	**Credits**			
PLSC 355		3	ECON 105, 201, or 202		3		
CHEM 117 or 121		3	Social & Behavioral Sc Gen Ed		3		
CHEM 117L or 121L		1	Major Option Electives		6		
SOIL 210		3	Free Elective		3		
Major Option Elective		3					
Free Elective		2					
		15			**15**		
Third Year							
Fall	**Credits**		**Spring**	**Credits**		**Summer**	**Credits**
PLSC 215		1	PLSC 380		3	PLSC 496, 493, or 494	1
PLSC 365		2	Major Option Electives		9		
PPTH 324		3	Free Elective		3		
Upper Division Writing Gen Ed		3					
Major Option Electives		4					
Free Electives		2					
		15			**15**		**1**
Fourth Year							
Fall	**Credits**		**Spring**	**Credits**			
ENT 350		3	PLSC 457		3		
PLSC 496, 493, or 494		1	PLSC 491		1		
Major Option Elective		3	Major Option Electives		6		
Wellness Gen Ed		2	Hum/Fine Arts & Glob Perspect Gen Ed		3		
Free Electives		6	Free Elective		2		
		15			**15**		

Total Credits: 120

Horticulture and Urban Agriculture

Department Information

- **Department Web Site:**
  www.ndsu.edu/agriculture/academics/academic-units/plant-sciences (http://www.ndsu.edu/agriculture/academics/academic-units/plant-sciences/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/horticulture/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/horticulture/#planofstudytext)

Major Requirements

Major: Horticulture and Urban Agriculture

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Required Core Courses for Horticulture		
PLSC 189	Skills for Academic Success [1]	1
CSCI 114	Computer Applications	3
or TL 116	Business Software Applications	
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab	4
or CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
ECON 105	Elements of Economics	3
or ECON 201	Principles of Microeconomics	
or ECON 202	Principles of Macroeconomics	
ENT 350	General Entomology	3
MATH 104	Finite Mathematics	3
or MATH 103	College Algebra	
PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1

PLSC 215	Weed Identification	1
PLSC 355	Woody Landscape Plants	3
PLSC 365	Herbaceous Landscape Plants	2
PLSC 380	Principles of Plant Physiology	3
PLSC 457	Horticulture and Turfgrass Systems (Capstone)	3
PLSC 491	Seminar	1
PLSC 496	Field Experience	2
or PLSC 493	Undergraduate Research	
or PLSC 494	Individual Study	
PPTH 324	Introductory Plant Pathology	3
SOIL 210	Introduction to Soil Science	3
Option: Students select one of the six options listed below.		
Option information: Students must select one of the options listed below to complete the major. The standard option is Production Business; if students wish to complete one of the other options availalbe they must officially declare their option with the Office of Registration and Records.		34
Total Credits		**76**

Production-Business Option (Standard) - 34 Credits

Code	Title	Credits
ENT 431	Principles of Insect Pest Management [2]	3
MGMT 320	Foundations of Management	3
MRKT 320	Foundations of Marketing	3
or MGMT 430	Leadership in Organizations	
PLSC 368	Plant Propagation	3
PLSC 468	Landscape Irrigation Design	2
PLSC 469	Landscape Irrigation Installation and Management	2
PPTH 455	Plant Disease Management [2]	3
or PPTH 457	Landscape Plant Pathology	
Electives: Select 15 credits of the following:		15
ABEN 286	Introduction to Controlled Environment Agriculture	
ASM 373	Tractors & Power Units	
ENTR 201	Introduction to Entrepreneurship	
PLSC 177	Floral Design I	
PLSC 296	Field Experience	
PLSC 323	Principles of Weed Science	
PLSC 375	Turfgrass Management	
PLSC 375L	Turfgrass Management Laboratory	
PLSC 412	Nursery Production and Management [2]	
PLSC 415	Vegetable Crop Production [2]	
PLSC 416	Fruit Crop Production [2]	
PLSC 422	Greenhouse Production and Management [2]	
PLSC 425	Potato Science [2]	
PLSC 453	Advanced Weed Science [2]	
PLSC 465	Advanced Landscape Plants [2]	
PLSC 484	Plant Tissue Culture and Biotechnology [2]	
PLSC 486	Applied Crop Physiology [2]	
SOIL 322	Soil Fertility and Fertilizers	
Total Credits		**34**

Horticulture Science Option - 34 Credits

Code	Title	Credits
BIOC 260	Elements of Biochemistry	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
CHEM 240	Survey of Organic Chemistry	3
MATH 146	Applied Calculus I	4
PLSC 315 & 315L	Genetics and Genetics Laboratory	4
PLSC 368	Plant Propagation	3
PLSC 484	Plant Tissue Culture and Biotechnology [2]	3
Electives: Select 9 credits of the following:		9
PLSC 296	Field Experience	
PLSC 323	Principles of Weed Science	
PLSC 375 & 375L	Turfgrass Management and Turfgrass Management Laboratory	
PLSC 411	Genomics [2]	
PLSC 412	Nursery Production and Management [2]	
PLSC 415	Vegetable Crop Production [2]	
PLSC 416	Fruit Crop Production [2]	
PLSC 422	Greenhouse Production and Management [2]	
PLSC 425	Potato Science [2]	
PLSC 431	Intermediate Genetics [2]	
PLSC 453	Advanced Weed Science [2]	
PLSC 465	Advanced Landscape Plants [2]	
PLSC 485	Arboriculture Science [2]	
PLSC 486	Applied Crop Physiology [2]	
PPTH 455	Plant Disease Management [2]	
or PPTH 457	Landscape Plant Pathology	
SOIL 465	Soil And Plant Analysis [2]	
STAT 330	Introductory Statistics	
STAT 331	Regression Analysis	
STAT 367	Probability	
STAT 462	Introduction to Experimental Design [2]	
Total Credits		**34**

Landscape Design Option - 34 Credits

This option also requires the completion of the Landscape Architecture minor (21 credits).

Code	Title	Credits
PLSC 177	Floral Design I	2
PLSC 341	Landscape Bidding, Contracting and Operations	2
PLSC 465	Advanced Landscape Plants [2]	3
PLSC 468	Landscape Irrigation Design	2
Electives: Select 4 credits of the following:		4
PLSC 296	Field Experience	
PLSC 375	Turfgrass Management	
PLSC 375L	Turfgrass Management Laboratory	
PLSC 412	Nursery Production and Management [2]	
PLSC 422	Greenhouse Production and Management [2]	
PLSC 469	Landscape Irrigation Installation and Management	
PLSC 485	Arboriculture Science [2]	
PPTH 457	Landscape Plant Pathology [2]	

Landscape Architecture Minor	21
Total Credits	**34**

Landscape management Option - 34 Credits

Code	Title	Credits
PLSC 341	Landscape Bidding, Contracting and Operations	2
PLSC 370	Landscape Management	3
PLSC 465	Advanced Landscape Plants [2]	3
PLSC 468	Landscape Irrigation Design	2
PLSC 469	Landscape Irrigation Installation and Management	2
PPTH 457	Landscape Plant Pathology [2]	3
Electives: Select 19 credits of the following:		19
ENT 431	Principles of Insect Pest Management [2]	
ENTR 201	Introduction to Entrepreneurship	
PLSC 296	Field Experience	
PLSC 323	Principles of Weed Science	
PLSC 368	Plant Propagation	
PLSC 375	Turfgrass Management	
PLSC 375L	Turfgrass Management Laboratory	
PLSC 381	Sports Turf Operations	
PLSC 412	Nursery Production and Management [2]	
PLSC 480	Advanced Turfgrass Topics [2]	
PLSC 485	Arboriculture Science [2]	
SOIL 322	Soil Fertility and Fertilizers	
Total Credits		**34**

Sports & Urban Turfgrass management Option - 34 Credits

Code	Title	Credits
PLSC 375 & 375L	Turfgrass Management and Turfgrass Management Laboratory	4
PLSC 381	Sports Turf Operations	3
PLSC 468	Landscape Irrigation Design	2
PLSC 469	Landscape Irrigation Installation and Management	2
PPTH 457	Landscape Plant Pathology [2]	3
SOIL 322	Soil Fertility and Fertilizers	3
Electives: Select 17 credits of the following:		17
ASM 373	Tractors & Power Units	
ASM 374	Power Units Laboratory	
ENT 431	Principles of Insect Pest Management [2]	
HNES 128	Golf	
PLSC 219	Introduction to Prairie & Community Forestry	
PLSC 296	Field Experience	
PLSC 323	Principles of Weed Science	
PLSC 341	Landscape Bidding, Contracting and Operations	
PLSC 465	Advanced Landscape Plants [2]	
PLSC 480	Advanced Turfgrass Topics [2]	
PLSC 485	Arboriculture Science [2]	
PPTH 455	Plant Disease Management [2]	
SOIL 217	Introduction to Meteorology & Climatology	
Total Credits		**34**

Urban Forestry & Parks Option - 34 Credits

Code	Title	Credits
PLSC 219	Introduction to Prairie & Community Forestry	2
PLSC 368	Plant Propagation	3
PLSC 386	Arboriculture Climbing and Rigging Operations	2
PLSC 412	Nursery Production and Management [2]	3
PLSC 465	Advanced Landscape Plants [2]	3
PLSC 485	Arboriculture Science [2]	3
PPTH 457	Landscape Plant Pathology [2]	3
Electives: Select 15 credits of the following:		15
ENT 431	Principles of Insect Pest Management [2]	
ENTR 201	Introduction to Entrepreneurship	
GEOG 105	Fundamentals of Geographic Information Systems	
NRM 264	Natural Resource Management Systems	
NRM 401	Urban-Ecosystem Management [2]	
PLSC 296	Field Experience	
PLSC 323	Principles of Weed Science	
PLSC 370	Landscape Management	
PLSC 375	Turfgrass Management	
PLSC 375L	Turfgrass Management Laboratory	
PLSC 416	Fruit Crop Production [2]	
PLSC 468	Landscape Irrigation Design	
PLSC 469	Landscape Irrigation Installation and Management	
SOIL 322	Soil Fertility and Fertilizers	
Total Credits		**34**

1

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

2

Students who are approved to complete the accelerated program in the Master of Science in Horticulture and Urban Agriculture are eligible to complete the 600 level course with graduate supervisor approval. Students are allowed to take 15 graduate credits and apply the graduate credit to these undergraduate program requirements. Students are required to complete the Accelerated Degree Student Declaration form and make formal application to the NDSU Graduate School.

Minor Requirements

Minor: Horticulture

Minimum Required Credits: 17

Minor Requirements

Code	Title	Credits
Required Courses		
PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1
Select two of the following courses listed below:		5-6
PLSC 355	Woody Landscape Plants	
PLSC 365	Herbaceous Landscape Plants	
PLSC 368	Plant Propagation	
Elective Courses: Select from the following:		**8-9**
PLSC 177	Floral Design I	
PLSC 341	Landscape Bidding, Contracting and Operations	
PLSC 370	Landscape Management	

PLSC 375	Turfgrass Management
PLSC 375L	Turfgrass Management Laboratory
PLSC 379	Global Seminar
PLSC 381	Sports Turf Operations
PLSC 386	Arboriculture Climbing and Rigging Operations
PLSC 412	Nursery Production and Management
PLSC 415	Vegetable Crop Production
PLSC 416	Fruit Crop Production
PLSC 422	Greenhouse Production and Management
PLSC 425	Potato Science
PLSC 465	Advanced Landscape Plants
PLSC 468	Landscape Irrigation Design
PLSC 469	Landscape Irrigation Installation and Management
PLSC 484	Plant Tissue Culture and Biotechnology
PLSC 485	Arboriculture Science
ENT 350	General Entomology
PPTH 324	Introductory Plant Pathology
SOIL 210	Introduction to Soil Science
Total Credits	**17-19**

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.

Hospitality & Tourism Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/hospitality-tourism-management/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/hospitality-tourism-management/)

As the nation's number one retail employer, the hospitality and tourism industry employs millions of people. The demand for managers continues to grow as the demand for services grows. Along with this demand for services is an increasing emphasis on comfort, convenience and personalized attention. All of these factors increase the need for effective and efficient professionals to manage hospitality operations and lead teams of people.

Hospitality & Tourism Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/hospitality-tourism-management/ (http://catalog.ndsu.edu/programs-study/undergraduate/hospitality-tourism-management/)

Minor Requirements

Minor: Hospitality & Tourism Management

Minimum Credits: 21

Code	Title	Credits
Required Courses		
MGMT 141	Travel Management	3
MGMT 241	Event Management	3
MGMT 320	Foundations of Management	3
MGMT 441	Events Experience and Planning	3
BUSN 140	Introduction to Hospitality Business	3
BUSN 211	World Culture and Food Service	3
Minor Elective		
Select one 3 credit class at the 300-400 level with one of the following prefixes: BUSN, MGMT, MRKT, and ENTR		3
Total Credits		**21**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Students must satisfy all course prerequisites.

Human Development and Family Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/hdfs/ (http://www.ndsu.edu/hdfs/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/human-development-family-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/human-development-family-science/)

Human Development and Family Science (HDFS) provides a program of study for students interested in a variety of careers that involve work with children, adults and/or families. Students majoring in HDFS may obtain a bachelor's degree.

CAREER OPPORTUNITIES

Career directions through HDFS can be divided into two general areas:

Direct Service to Children, Adults and Families – child life specialist, human services professional, child protection service professional, outreach worker, parent and family life educator, gerontology outreach, extension agent, or financial counselor, mental health therapist or counselor (with graduate degree).

Support Service to Children, Adults and Families – program director for nursing or retirement facility, child care director, consultant in human development, hospital-related services, researcher, child advocate.

Some of the listed careers require a planned minor or a double major. Other careers require preparations beyond the bachelor's degree level. An HDFS degree is excellent preparation for students considering graduate work in counseling, family therapy, child development, gerontology, and developmental science. Study in HDFS provides course work for students interested in careers involving human relations.

Graduates from HDFS are currently employed in a variety of careers. These include extension agent, Head Start program director, child care director, home visitor for Head Start, crisis family counselor, hospital child life specialist, family life educator, developmental disabilities worker, volunteer coordinator, parent support specialist, parent educator, financial counselor and financial planner.

The Program

The major emphasis in HDFS programs is family and human development over the life span. Students gain an understanding of the development of children and adults and their interaction in the family within society.

Students majoring in HDFS have three options: adult development and aging; child and adolescent development; and family science. Each of these options can be completed by itself or can be paired with another degree in one of our dual degree programs. Child development can be paired with elementary education, and family science and adult development and aging can be paired with social work. Information on these dual degree programs is on a separate fact sheet. Each of these options can also be combined with a master's degree program in one of our combined/accelerated master's programs. Child and adolescent development can be combined with the master's program in youth development; family science can be

combined with the master's program in family financial planning; and adult development and aging can be combined with the master's program in gerontology. Information on these combined/accelerated degree programs is on a separate sheet.

Courses in the program include:

- Adolescent Development
- Adult Development and Aging
- Child Development
- Diversity and Multiculturalism in Individual and Family Life
- Children, Families, and Public Policy
- Personal and Family Finance
- Issues in Human Sexuality
- Life Span Human Development
- Parent-Child Relations
- Family Dynamics of Aging
- Couples, Marriages, and Families

Students majoring in HDFS enroll for credit in field experience as a critical part of their program of study. The department offers opportunities to work with children, youth, adolescents, older adults and families in various settings.

The Facilities

Facilities for the Department of Human Development and Family Science are housed in Evelyn Morrow Lebedeff Hall and the Family Life Center. Included in these buildings are classrooms, conference rooms, research labs, and a child development center serving young children and their families.

Community Setting

The Fargo-Moorhead metropolitan area offers a conducive setting for study. Students have the opportunity to work in a number of community institutions serving children and families. Professionals working with older adults, child care programs, mental health centers, chemical dependency treatment centers, medical facilities and welfare agencies visit classes and conduct tours to explain their programs for children and families.

Extra-Curricular Opportunities

Students may enhance their involvement in the HDFS area by participating in groups such as the HDFS Club, the North Dakota Association for the Education of Young Children, and the North Dakota Family and Consumer Sciences Association.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Human Development and Family Science

Freshman				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110		3	SOC 110	3
HDFS 230		3	COMM 110	3
HDFS 242		3	ENGL 120	3
PSYC 111		3	Humanities/Fine Arts & Glob Persp Gen Ed	3
Free Elective		3	Free Elective	3
		15		**15**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
Science & Tech Gen Ed w/ Lab		4	Humanities & Fine Arts Gen Ed	3
Science & Tech Gen Ed		3	Science & Tech Gen Ed	3
HDFS 250		3	STAT 330	3

Free Elective	3	HDFS 275	3
Free Elective	2	Free Elective	3
	15		**15**
Junior			
Fall	**Credits**	**Spring**	**Credits**
HDFS Option Course*	3	HDFS 389	2
HDFS 300- or 400-level elective	3	HDFS 390	1
ENGL 320, 325, 358, or 459	3	HDFS Option Course*	3
Elective for Minor	3	HDFS 300- or 400-level elective	3
Free Elective	3	Elective for Minor	3
		Free Elective	3
	15		**15**
Senior			
Fall	**Credits**	**Spring**	**Credits**
HDFS 496	3	HDFS Option Course*	3
HDFS 353	3	HDFS 300- or 400-level elective	3
HDFS Option Course*	3	Elective for Minor	3
Elective for Minor	3	Elective for Minor	3
Elective for Minor	3	Free Elective	3
	15		**15**

Total Credits: 120

*HDFS Option Courses: Adult Development and Aging (HDFS 360, 357, 480, and 482)
Child and Adolescent Development (HDFS 320, 330, 340, and Either 424 or 483)
Family Science (HDFS 341, 357, 448, and 462)

Sample Program Guide

HDFS Accelerated Master's Option in Gerontology

Undergraduate students in the Adult Development and Aging option can earn a Master's degree in HDFS in the Gerontology option by completing just one additional year of classes. 15 credits of the undergraduate curriculum are replaced by 15 graduate credits. Students graduate with the B.S. after year 4 and with the M.S. after year 5.

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	3	SOC 110	3
HDFS 230	3	COMM 110	3
HDFS 242	3	ENGL 120	3
PSYC 111	3	Global Perspectives Gen Ed	3
Free Elective	3	Humanities & Fine Arts Gen Ed	3
	15		**15**
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
Science & Tech Gen Ed w/ Lab	4	Humanities & Fine Arts Gen Ed	3

Science & Tech Gen Ed		3	Science & Tech Gen Ed		3
HDFS 250		3	HDFS 275		3
Free Elective		3	STAT 330		3
Free Elective		2	Free Elective		3
		15			**15**
Junior					
Fall	**Credits**		**Spring**	**Credits**	
HDFS 360		3	HDFS 389		2
ENGL 320, 325, 358, or 459		3	HDFS 390		1
HDFS 357		3	HDFS 353		3
Elective for Minor		3	Elective for Minor		3
Elective for Minor		3	Elective for Minor		3
			Free Elective		3
		15			**15**
Senior					
Fall	**Credits**		**Spring**	**Credits**	
HDFS 480		3	Elective for Minor		3
HDFS 496		3	HDFS 721		3
HDFS 723		3	HDFS 7XX Elective		3
Elective for Minor		3	HDFS 7xx Elective		3
Free Elective		3	Course from Block 2, 3, or 4[1]		3
		15			**15**
Fifth Year					
Fall	**Credits**		**Spring**	**Credits**	
HDFS 7XX Elective		3	HDFS 794		3
HDFS 7XX Elective		3	Course from Block 2, 3, or 4[1]		3
Course from Block 2, 3, or 4[1]		3			
		9			**6**

Total Credits: 135

1. Block 2: HNES 652, HDFS 725, or HDFS 790. Block 3: HDFS 726, ADHM 705, HDFS 790. Block 4: HDFS 760, HDFS 761, HDFS 722, or HDFS 790. See advisor for determining which Block an HDFS 790 belongs in.

Degree Notes:

- How to Apply to the Program (https://www.ndsu.edu/fileadmin/hdfs/documents/graduate_forms/accelerated-programs_0922.pdf)
- More Information About the Gerontology Master's Option (https://www.ndsu.edu/dce/online_degrees/gp_idea_programs/gerontology_masters/)

Sample Program Guide

HDFS Accelerated Master's Option in Family Financial Planning

Undergraduate students in the Family Science option can earn a Master's degree in HDFS in the Family Financial Planning option by completing just one additional year of classes. Fifteen credits of the undergraduate curriculum are replaced by 15 graduate credits. Students graduate with the B.S. after the fourth year and with the M.S. after the fifth year.

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110		3	SOC 110	3
HDFS 230		3	COMM 110	3
HDFS 242		3	ENGL 120	3
PSYC 111		3	Humanities & Fine Arts Gen Ed	3
Free Elective		3	Global Perspectives Gen Ed	3
		15		**15**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
Science & Tech Gen Ed w/ Lab		4	Humanities & Fine Arts Gen Ed	3
Science & Tech Gen Ed		3	HDFS 275	3
HDFS 250		3	Science & Tech Gen Ed	3
Free Elective		3	STAT 330	3
Free Elective		2	Free Elective	3
		15		**15**
Junior				
Fall	**Credits**		**Spring**	**Credits**
HDFS 357		3	HDFS 389	2
ENGL 320, 325, 358, or 459		3	HDFS 390	1
Elective for Minor		3	HDFS 341	3
Elective for Minor		3	Elective for Minor	3
Elective for Minor		3	Elective for Minor	3
			Free Elective	3
		15		**15**
Senior				
Fall	**Credits**		**Spring**	**Credits**
HDFS 353		3	HDFS 462	3
HDFS 770		3	HDFS 677	3
HDFS 496		3	HDFS 762	3
Elective for Minor		3	HDFS 763	3
Free Elective		3	HDFS 771	3
		15		**15**
Fifth Year				
Fall	**Credits**		**Spring**	**Credits**
HDFS 765		3	HDFS 769	3
HDFS 766		3	HDFS FFP Elective	3
HDFS FFP Elective		3		
		9		**6**

Total Credits: 135

Degree Notes:

- How to Apply to the Program (https://www.ndsu.edu/fileadmin/hdfs/documents/graduate_forms/accelerated-programs_0922.pdf)
- More Information About the Family Financial Planning Master's Option (https://www.ndsu.edu/dce/online_degrees/gp_idea_programs/family_financial_planning_masters/)

Sample Program Guide

HDFS Accelerated Master's Option in Youth Development

Undergraduate students in the Child and Adolescent Development option can earn a Master's degree in HDFS in the Youth Development option by completing just one additional year of classes. Fifteen credits of the undergraduate curriculum are replaced by 15 graduate credits. Students graduate with the B.S. after the fourth year and with the M.S. after the fifth year.

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman							
Fall	**Credits**		**Spring**	**Credits**			
ENGL 110		3	SOC 110	3			
HDFS 230		3	COMM 110	3			
HDFS 242		3	ENGL 120	3			
PSYC 111		3	Global Perspectives Gen Ed	3			
Free Elective		3	Humanities & Fine Arts Gen Ed	3			
		15		**15**			
Sophomore							
Fall	**Credits**		**Spring**	**Credits**			
Science & Tech Gen Ed w/ Lab		4	Humanities & Fine Arts Gen Ed	3			
Science & Tech Gen Ed		3	HDFS 275	3			
HDFS 250		3	Science & Tech Gen Ed	3			
Free Elective		3	STAT 330	3			
Free Elective		2	Free Elective	3			
		15		**15**			
Junior							
Fall	**Credits**		**Spring**	**Credits**			
HDFS 340		3	HDFS 389	2			
ENGL 320, 325, 358, or 459		3	HDFS 390	1			
Elective for Minor		3	HDFS 330	3			
Elective for Minor		3	Elective for Minor	3			
Free Elective		3	Elective for Minor	3			
			Free Elective	3			
		15		**15**			
Senior							
Fall	**Credits**		**Spring**	**Credits**	**Summer**	**Credits**	
HDFS 353		3	HDFS 483	3	HDFS 7XX YD Elective		3
HDFS 496		3	HDFS 711	3			
HDFS 710		3	HDFS 712	3			
Elective for Minor		3	HDFS 716	3			
Elective for Minor		3	HDFS 7XX YD Elective	3			
		15		**15**			**3**

Fifth Year			
Fall	**Credits**	**Spring**	**Credits**
HDFS 713	3	HDFS 718	3
HDFS 717	3	HDFS 719	3
HDFS 730	3	HDFS 794	3
	9		**9**

Total Credits: 141

Degree Notes:

- How to Apply to the Program (https://www.ndsu.edu/fileadmin/hdfs/documents/graduate_forms/accelerated-programs_0922.pdf)
- More Information About the Youth Development Master's Option (https://www.ndsu.edu/dce/online_degrees/gp_idea_programs/youth_development_masters/)

Human Development and Family Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/hdfs/ (http://www.ndsu.edu/hdfs/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/human-development-family-science/ (http://catalog.ndsu.edu/programs-study/undergraduate/human-development-family-science/)

Major Requirements

Major: Human Development & Family Science

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**

Category A: Humanities and Fine Arts [†]	**6**
Category B: Social and Behavioral Sciences [†]	**6**
Category W: Wellness [†]	**2**
Category D: Cultural Diversity [*†]	
Category G: Global Perspectives [*†]	
Total Credits	**39**

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Human Development & Family Science Core Requirements		
HDFS 230	Life Span Development	3
HDFS 242	Couples, Marriages and Families	3
HDFS 250	Introduction to Research Methods in Human Development and Family Sciences	3
HDFS 275	Diversity and Multiculturalism in Individual and Family Life	3
HDFS 353	Children, Families and Public Policy	3
HDFS 389	Pre-Field Experience	2
HDFS 390	Career Development	1
HDFS 496	Field Experience [1]	3
PSYC 111	Introduction to Psychology	3
SOC 110	Introduction to Sociology	3
STAT 330	Introductory Statistics	3
Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Option Selection		
Select one option from the three listed below: Adult Development & Aging; Child & Adolescent Development; Family Science		21
Minor Plan of Study		
A minor plan of study is required outside of the HDFS department for all options.		16
Total Credits		**70**

Adult Development and Aging Option

Code	Title	Credits
HDFS 357	Personal and Family Finance	3
HDFS 360	Adult Development and Aging	3
HDFS 480	Community Resources of Later Life	3
HDFS 482	Family Dynamics of Aging	3
HDFS 300-400 Level	Major Electives (can include up to 3 credits of HDFS 496 or HDFS 491)	9
Total Credits		**21**

Child and Adolescent Development Option

Code	Title	Credits
HDFS 320	Prenatal, Infant and Toddler Development	3
HDFS 330	Child Development	3
HDFS 340	Adolescent Development	3
Select one of the following:		3

HDFS 424	Observation and Assessment of Children	
HDFS 483	Best Practices, Play and Activities from Birth Through Adolescence	
HDFS 300-400 Level	Major Electives (can include up to 3 credits of HDFS 496 or HDFS 491)	9
Total Credits		**21**

Family Science Option

Code	Title	Credits
HDFS 341	Parent-Child Relations	3
HDFS 357	Personal and Family Finance	3
HDFS 448	Issues In Sexuality	3
HDFS 462	Methods of Family Life Education	3
HDFS 300-400 Level	Major Electives (can include up to 3 credits of HDFS 496 or HDFS 491)	9
Total Credits		**21**

1

In the semester prior to taking field experience credits, students are required to take HDFS 389 Pre-Field Experience. Note: HDFS 491 Senior Thesis may be completed as elective.

Degree Requirements and Notes

- A grade of C or better is required for all HDFS courses, regardless of whether they are used for the major core, major electives, general education, or free electives.
- A 2.50 cumulative GPA is required in major courses for graduation.
- Courses taken *Pass/Fail* will not be used to satisfy any requirement other than total credits.

Accelerated Program in HDFS

- A combined/accelerated program will allow high-achieving students to complete both a bachelor's and master's degree in HDFS in five years.
- Only students with a cumulative undergraduate GPA of at least 3.0 and who have completed at least 60 credits are eligible to apply. Interested students should speak with an HDFS advisor about how to proceed.
- 15 credits at the master's level may be used to meet the requirements for a bachelor's degree.
- The programs will map as follows:
  - BS-HDFS program with an option in Adult Development and Aging may enter the master's option Gerontology.
  - BS-HDFS program with an option in Child and Adolescent Development may enter the master's option in Youth Development.
  - BS-HDFS program with an option in Family Science may enter the master's option in Family Financial Planning

Minor Requirements

Minor: Human Development & Family Science

Required Credits: 18

Code	Title	Credits
Required Courses		
HDFS 230	Life Span Development	3
HDFS 242	Couples, Marriages and Families	3
Elective Courses [1]		
HDFS	Any Level Elective	12
Total Credits		**18**

1

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.

Industrial Engineering and Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/ime/ (http://www.ndsu.edu/ime/)
- **Credential Offered:**
  B.S.I.E.Mgt.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/industrial-engineering-management/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/industrial-engineering-management/)

Industrial engineering students have the opportunity to design systems and processes that improve the quality and productivity of an organization's business activities. They employ a strong foundation in fundamental engineering and management skills to effectively integrate people and resources to create positive change. Simply put, students will design and implement the best way to get work done.

THE PROFESSION

The field of industrial engineering is inherently interdisciplinary and spans across various industries, including manufacturing, healthcare, hospitality, banking and finance, food processing, chemical and oil, distribution and logistics, and more. Industrial engineers play a crucial role in designing, enhancing, and installing integrated systems involving people, materials, information equipment and energy. Their responsibilities often encompass improving productivity, optimizing supply chains, project management, and conducting feasibility studies for new technologies, lean and just-in-time implementation, health care management and logistics, and systems integration and engineering solutions. Whether it involves reducing wait times in a rollercoaster line, streamlining an operating room, overseeing a global supply chain, developing high-performance automobiles, or resolving complex logistics issues, industrial engineers are at the forefront of driving efficiency and innovation.

THE PROGRAM

The Department of Industrial and Manufacturing Engineering (IME) at North Dakota State University provides two programs that culminate in a Bachelor of Science degree. Students can pursue a degree in either Industrial Engineering and Management or Manufacturing Engineering. Notably, NDSU has the only Industrial Engineering and Management program in North Dakota. The Bachelor of Science in Industrial Engineering and Management program is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the commission's General Criteria and Program Criteria for Industrial and Similarly Named Engineering Programs. This accreditation reflects the program's commitment to maintaining high educational standards and ensuring its graduates are well-prepared for the engineering profession.

Motivated undergraduate students within the program have the opportunity to explore two options for accelerated master's degrees:

1. Accelerated MBA: The IE&M/MBA accelerated program is offered by the IME Department in collaboration with the College of Business. This program enables students to earn their MBA within one additional year.
2. Accelerated Master of Engineering: The advantage of the Master of Engineering program lies in the application of pre-established coursework at the 600 level to be applied to both degrees, offering a streamlined educational experience. This degree program offers a non-thesis option for those wishing to earn a graduate degree. The program consists of a minimum of 30 credits of study and a written examination and only requires one additional year of study beyond the undergraduate degree.

To be eligible for admission to the graduate school and pursue either the IE&M/MBA or Master of Engineering accelerated programs, students must have completed a minimum of 60 credits and maintained a cumulative GPA of 3.0 or higher.

THE FACULTY AND FACILITIES

The IME department is currently housed in the Engineering Building, which is part of an eight-building engineering complex. The department has seven laboratories well equipped for teaching and research, offering valuable support for students' educational and research needs. These specialized laboratories cover a range of areas, including computer simulation, human factors, automation and robotics, additive manufacturing and biomanufacturing, computational modeling, bioinformatics and operations research, PLC's, manufacturing processes, rapid prototyping, CNC machining, and microfabrication, as well as welding and precision manufacturing. In the fall of 2026, NDSU's College of Engineering is set to open the new Richard Offerdahl '65 Engineering Complex. This cutting-edge facility will feature state-of-the-art research and learning spaces, equipping future engineers to meet the ever-changing demands of both the University and industry for generations to come.

The faculty and staff within the IME department have extensive experience in industrial and manufacturing specialties. They prioritize a personalized learning environment, dedicated to personally knowing each student, recognizing their strengths, understanding potential challenges, and providing support whenever necessary. Upon completion of a degree at NDSU, students will leave not only with a strong foundation for career success but also the confidence and capability for lifelong personal growth. Additionally, they will have established a network of both friends and professional colleagues.

CAREER OPPORTUNITIES

Graduates of the IME programs at NDSU are employed in a diverse array of industries across the United States and globally. Industries seek individuals with a high level of education, adept problem-solving skills, and effective communication abilities. IME graduates are well-equipped to meet these demands, presenting them an endless number of opportunities for career choices and geographic locations, as well as fast-paced career growth. Graduates of the IME programs have become a source of talent working in industries such as health care, manufacturing, consulting, food, transportation and distribution, and information systems. Recent IME graduates command starting salaries in the top rank of engineering disciplines.

According to the U.S. Bureau of Labor Statistics, the national median salary for industrial engineers is $96,350 (**https://www.bls.gov/ooh/architecture-and-engineering/industrial-engineers.htm**).

TRANSFER ADMISSION

Students who transfer with an AA or AS degree will have lower division general ed credits satisfied.

SCHOLARSHIP AND FINANCIAL AID

The Department awards several scholarships annually. Scholarships are available for incoming freshman, transfer students, and currently enrolled students. Other forms of financial aid are available through the Office of Financial Aid and Scholarships.

SELECTIVE ADMISSION

Transfer students must have a minimum cumulative grade point average of 2.3.

INDUSTRIAL ENGINEERING AND MANAGEMENT MINOR

Students pursuing a major in any engineering discipline have the option to elect a minor in Industrial Engineering and Management. This elective path provides 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 framework of people, technology, machinery and information that constitutes a successful modern business enterprise. Students completing this minor will achieve a better understanding of organizational and management processes and will be better prepared to work in the multi-functional teams crucial to success in industry. The total requirement for this minor is 18 credits (6 credits are required courses and 12 credits of approved electives), 9 of which must be unique and not count towards the major.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
CHEM 121 & 121L	4	IME 111	3
ENGL 110	3	MATH 166	4
ENGL 120	3	ME 212	3
MATH 165	4	ME 221	3
Comp Sci Elective (CSCI 122, 159, 160, 227, orvECE 173)	3	CHEM 122	3
	17		**16**
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	IME 311	3
IME 330	3	ME 223	3
MATH 129	3	MATH 266	3
MATH 259	3	PHYS 252 & 252L	5
ME 222	3	Gen Ed Social & Behavioral Science/ Global Perspectives	3
Gen Ed Humanities/Fine Arts/ Cultural Diversity	3		
	18		**17**
Junior			
Fall	**Credits**	**Spring**	**Credits**
IME 456	3	IME 461	3

IME 460	3	IME 470	3
ENGL 321	3	IME 472	3
CE 309	3	ME 350	3
IME 440	3	Gen Ed Social & Behavioral Science	3
		Gen Ed Wellness	2
	15		**17**

Senior

Fall	Credits	Spring	Credits
IME 480	3	IME 450	3
ENGR 327	3	IME 489	3
IME 482	3	Engr Sci Elective (Select one from EE 206, ECE 275, ECE 301	3
IME 485	3	Tech Elective (Select from official curriculum)	3
Tech Elective (Select from official curriculum)	3	Tech Elective (Select from official curriculum)	3
	15		**15**

Total Credits: 130

Degree Notes:

- Grades less than 'C' will not be accepted for required courses in CHEM, MATH, and PHYS.
- Students may request approval for other 300-400 level engineering or related courses to be approved as technical electives. To request approval, a student should submit a request to the IME Department indicating the course of interest and why the course should be approved as a technical elective. This request 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.

Industrial Engineering and Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/ime/ (http://www.ndsu.edu/ime/)
- **Credential Offered:**
  B.S.I.E.Mgt.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/industrial-engineering-management/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/industrial-engineering-management/#planofstudytext)

Major Requirements

Major: Industrial Engineering & Management

Degree Type: B.S.I.E.Mgt.
Minimum Degree Credits to Graduate: 130

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.

7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

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Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Industrial Engineering & Management Core Requirements		
IME 111	Introduction to Industrial and Manufacturing Engineering	3
IME 311	Work/Station Design and Measurement	3
IME 330	Manufacturing Processes	3
IME 440	Engineering Economy	3
IME 450	Systems Engineering and Management	3
IME 456	Program and Project Management	3
IME 460	Evaluation of Engineering Data	3
IME 461	Quality Assurance and Control	3
IME 470	Operations Research I	3
IME 472	Simulation of Business and Industrial Systems	3
IME 480	Production and Inventory Control	3
IME 482	Automated Manufacturing Systems	3
IME 485	Industrial and Manufacturing Facility Design	3
IME 489	Industrial and Manufacturing Engineering Capstone	3
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
ME 212	Fundamentals of Visual Communication for Engineers	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122	General Chemistry II (May satisfy general education category S)	3
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
ENGR 327	Ethics, Engineering, and Technology	3
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
Industrial Engineering and Management Electives		
Computer Science Electives: Select one of the following:		3
CSCI 122	Visual BASIC	
CSCI 159	Computer Science Problem Solving	
CSCI 160	Computer Science I	
CSCI 227	Computing Fundamentals in Python I	
ECE 173	Introduction to Computing	
Programming Language: Any programming language course must be approved by your adviser.		
Engineering Science Electives: Select 12 credits from the following:		
CE 309	Fluid Mechanics	3
ME 223	Mechanics of Materials	3
ME 350	Thermodynamics and Heat Transfer	3
Select one of the following:		3-4
EE 206	Circuit Analysis I	
ECE 275	Digital Design	
ECE 301	Electrical Engineering I	
Technical Electives: Select 9 credits from the following:		9
IME 335	Welding Technology	
IME 380	CAD/CAM for Manufacturing	
IME 411	Human Factors Engineering	
IME 427	Packaging for Electronics	
IME 430	Process Engineering	
IME 431	Production Engineering	
IME 432	Composite Materials Manufacturing	
IME 437	Methods for Precision Manufacturing	
IME 433	Additive Manufacturing	
IME 435	Plastics and Polymer Processing in Manufacturing	
IME 451	Logistics Engineering and Management	
IME 453	Hospital Management Engineering	
IME 462	Total Quality In Industrial Management	
IME 463	Reliability Engineering	
IME 464	Reliability Analysis	
IME 465	Introduction to Machine Learning	
Only one of the following 5 courses may be counted as a technical elective.		
BUSN 340	International Business	
BUSN 431	Business Law I-Contracts, Property and Torts	
MGMT 320	Foundations of Management	
MRKT 320	Foundations of Marketing	
MIS 320	Management Information Systems	
Total Credits		**110-111**

Degree Requirements and Notes

- Grades less than 'C' will not be accepted for required courses in CHEM, MATH, and PHYS.
- Students may request approval for other 300-400 level engineering or related courses to be approved as technical electives. To request approval, a student should submit a memo to the IME Department indicating the course of interest and why the course should be approved as a technical elective. This memo will be reviewed by the IME Department Chair for approval.
- 300-400 level BUSN courses require at least junior standing and a minimum 2.50 cumulative GPA.

Accelerated subplan:

Code	Title	Credits
ACCT 200 & ACCT 201	Elements of Accounting I and Elements of Accounting II	3 or 6
or ACCT 102	Fundamentals of Accounting	
ECON 201 & ECON 202	Principles of Microeconomics and Principles of Macroeconomics	3 or 6
or ECON 105	Elements of Economics	
FIN 320	Principles of Finance	3
IME 640	Engineering Economy (in place of IME 440; cannot take as 4 credits)	3
IME 656	Program and Project Management (in place of IME 456)	3
IME 670	Operations Research I (in place of IME 470)	3
IME 672	Simulation of Business and Industrial Systems (in place of IME 472)	3
IME 680	Production and Inventory Control (in place of IME 480)	3
MGMT 320	Foundations of Management (take as tech elective for IE&M major)	3
MRKT 320	Foundations of Marketing (take as tech elective for IE&M major)	3
STAT 330	Introductory Statistics (or IME 460)	3
Total Credits		**33-39**

Degree Requirements and notes

- To be eligible for the accelerated program, students must complete 60 credits and have a GPA of 3.0 or higher to apply to the graduate school.

Minor Requirements

Minor: Industrial Engineering & Management

Required Credits: 18

Code	Title	Credits
Required Courses		
IME 111	Introduction to Industrial and Manufacturing Engineering	3
IME 311	Work/Station Design and Measurement	3
Electives: Select 12 credits from the following:		**12**
IME 450	Systems Engineering and Management	
IME 451	Logistics Engineering and Management	
IME 453	Hospital Management Engineering	
IME 456	Program and Project Management	
IME 461	Quality Assurance and Control	
IME 462	Total Quality In Industrial Management	
IME 463	Reliability Engineering	
IME 465	Introduction to Machine Learning	
IME 470	Operations Research I	
IME 472	Simulation of Business and Industrial Systems	
IME 480	Production and Inventory Control	
IME 482	Automated Manufacturing Systems	

IME 485	Industrial and Manufacturing Facility Design	
Total Credits		**18**

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.
- 9 of the 18 credits for this minor must be unique and cannot count toward requirements in the student's engineering major.
- Only students majoring in an engineering discipline or with department permission agricultural or physical science majors may elect a minor in Industrial Engineering & Management.

Information Technology

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  /undergraduate/program-curriculum/information-technology/ (http://catalog.ndsu.edu/programs-study/undergraduate/information-technology/ http:///undergraduate/program-curriculum/information-technology/)

Information Technology is rapidly becoming the basis of most aspects of society. Working with practical systems while understanding underlying principles enables confident problem solving in this fast-changing environment. Systems, both cloud and physical systems, and applications together shape the information technology landscape.

THE PROGRAM

The Information Technology program bridges the technical and the theoretical side of computing. It is designed to provide the technical understanding that enables graduates to succeed in a world of rapidly advancing technology. At the same time, it includes the foundational knowledge that grounds applications in principles that remain important over time. System and application technologies are both considered.

CAREER OPPORTUNITIES

Technologists are needed in most businesses. The breadth and practical relevance of the information technology program makes graduates of this program particularly flexible in their choice of career path. The move to cloud technology has softened the historical division between system and applications experts and increased the need for those who have expertise in both areas. Graduates of the Information Technology program are in an excellent position to help advance technological innovation.

HIGH SCHOOL PREPARATION

The program does not explicitly require specific high school preparation. Taking IT, programming, networking or security content can be helpful but is not required. Likewise, it is useful, but not required, to take algebra and trigonometry in high school.

THE FACILITIES

The NDSU computer science department has a 40-seat Linux lab, extensive cloud resources, a cluster of remotely assessable Linux workstations, a number of virtual machines, and Hadoop and Spark analytic systems. Research labs support Windows, Macs, and Linux computers along with various peripheral equipment such as a cyber range, drones, and 3D printers. The department and the University have assumed a leadership role in computer networking through the acquisition and implementation of high-bandwidth network switches. The University also has entered into a six-state consortium for extremely high-level networking in the Upper Midwest. The high-performance Center for Computationally Assisted Science and Technology (CCAST) is available for distributed research projects. We are also a charter member of Internet2 and have connectivity to the national vBNS research network. The department maintains numerous web servers for class assignments and other information, which are accessed by thousands of users each day.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
CSCI 105		3	CSCI 177	3
CSCI 159		3	CSCI 228 or 160	3
CSCI 227		3	ENGL 120	3
MATH 105		3	COMM 110	3
ENGL 110		3	Humanities/FA Gen Ed	3
		15		**15**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
CSCI 161		4	CSCI 371	3
CSCI 213		3	CSCI 377	3
CSCI 277		3	STAT 330	3
Humanities/FA Gen Ed and Global Perspectives		3	Social/Behavioral Sci Gen Ed and Cultural Diversity	3
Science/Tech Gen Ed		3	Science/Tech with Lab Gen Ed	4
		16		**16**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
CSCI 222		3	CSCI 313	3
CSCI 312 or 372		3	CSCI 374	3
CSCI 366		3	CSCI 359	3
CSCI 397 or 300		3	ENGL 321	3
CSCI 450		3	Science/Tech Gen Ed	3
		15		**15**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
CSCI 305		3	CSCI 445	3
CSCI 474		3	CSCI Tech Elective[1]	3
CSCI 489		3	Gen Ed Wellness	2
CSCI Tech Electives[1]		3	Free Elective	6
Social/Behavioral Sci Gen Ed		3		
		15		**14**

Total Credits: 121

1

Tech Electives: CSCI 410 Computer Crime and Forensics, CSCI 422 Fundamentals of Data Engineering, CSCI 473 Foundations of the Digital Enterprise, CSCI 476 Cloud Systems Administration, CSCI 488 Human-Computer Interaction

Information Technology

Department Information

- **Department Web Site:**
  https://www.ndsu.edu/cs/
- **Credential Offered:**
  B.S.
- **Program Overview:**

/programs-study/undergraduate/information-technology/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/information-technology/ http:///programs-study/undergraduate/information-technology/)

Major Requirements

Major: Information Technology

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Code	Title	Credits
Core Information Technology Requirements		
CSCI 105	Introduction to Cybersecurity	3
CSCI 159	Computer Science Problem Solving	3
CSCI 177	Introduction to Information Technology	3
CSCI 213	Modern Software Development	3
CSCI 222	Discrete Mathematics	3
CSCI 277	Introduction to UNIX	3
CSCI 305	Principles of Cybersecurity	3
CSCI 312	Survey of Programming Languages	3

or CSCI 372	Comparative Programming Languages	
CSCI 313	Software Development with Frameworks	3
CSCI 359	Networking	3
CSCI 366	Database Systems	3
CSCI 371	Web Scripting Languages	3
CSCI 374	Computer Organization and Architecture	3
CSCI 377	Information Technology	3
CSCI 397	Fe/Coop Ed/Internship (or any 300 or 400 level IT or CS elective)	3
CSCI 445	Software Projects Capstone	3
CSCI 450	Cloud Computing	3
CSCI 474	Operating Systems Concepts	3
CSCI 489	Social Implications of Computers	3
MATH 105	Trigonometry	3
STAT 330	Introductory Statistics	3
Select one of the following sequences:		8 or 9
Sequence One:		
CSCI 227	Computing Fundamentals in Python I	
CSCI 228	Computing Fundamentals in Python II	
CSCI 229	Computing Fundamentals in Python III	
Sequence Two:		
CSCI 160	Computer Science I	
CSCI 161	Computer Science II	
Technical Electives - Select 2 courses from the following:		6
CSCI 410	Computer Crime and Forensics	
CSCI 422	Fundamentals of Data Engineering	
CSCI 473	Foundations of the Digital Enterprise	
CSCI 476	Cloud Systems Administration	
CSCI 488	Human-Computer Interaction	
Total Credits		**77-78**

Interior Design

Department Information

- **Department Web Site:**
  www.ndsu.edu/adhm/interior_design/overview/ (http://www.ndsu.edu/adhm/interior_design/overview/)
- **Credential Offered:**
  B.A.; B.S.
- **Official Program Curriculum:**
  http://catalog.ndsu.edu/undergraduate/program-curriculum/interior-design/

A professional interior designer is one who is qualified by education, examination, and experience to identify, research and creatively solve problems relative to the function and quality of people's interior environments. The course of study in interior design leads to a first professional degree.

Background Information

The program focuses on improving the quality of life and protecting human health and safety through design of the interior environment. Students study design fundamentals, theory, process, communication, research, and technology to identify and solve problems for a wide range of physical interior environments for all individuals.

The Program

The Department of Architecture offers an accredited undergraduate degree program in interior design. The first two years of the program introduce the fundamentals of design, visual and technical communication techniques (including drafting, model building, rendering, computer-aided design), and theoretical and practical applications (including anthropometrics, ergonomics, inclusive design, interior design technology, and color theory). Each student becomes aware that the interior design profession is exceedingly complex, and collaborating with design professionals and related disciplines in a team approach to problem-solving is routine practice.

Beginning their first year through their final semester, students interact with professionals during industry tours, critiques, and guest speaking events, providing a direct connection to the interior design profession. Upper-division course work is focused on a series of integrated studio experiences and supporting courses including history, evidence-based design, interior materials, professional practice, building information modeling and interior systems. The studio experience culminates in a senior capstone project. Studio experiences require that each student be exposed to a variety of projects at several different levels of complexity and different client project goals.

Field Experience

North Dakota State University interior design students are required to complete a field experience between the third and fourth year of the program. Students accept a variety of positions throughout the United States and abroad. Students have completed field experiences in places such as Los Angeles, Minneapolis, Denver, Florida, New York and Ireland.

Selective Admission

Admission into the second year professional program comes at the conclusion of the first year of the pre-professional program and is based upon demonstrated professional interest and involvement, a 3.0 institutional cumulative GPA, a minimum grade of C in all major core requirements, and a student portfolio. Students must maintain the 3.0 minimum cumulative GPA requirement and a grade of C or better in all major core requirements throughout the remainder of the program.

COMPUTER REQUIREMENTS

All students are required to purchase a laptop computer prior to starting the program. Students **must be in compliance** with the computer requirements posted on the program website. Computers failing to be in compliance will not be supported.

Accreditation

The interior design program at NDSU is accredited by the Council for Interior Design Accreditation (CIDA) and received re-accreditation in 2024. The program is also accredited by the National Association of Schools of Art and Design (NSAD).

Career Opportunities

Three main career paths are typically chosen by the design professional include residential, commercial, and specialized design. Residential design includes kitchen and bath design, renovation for physically challenged, model homes or historical restoration. Commercial design includes corporate and executive offices, healthcare, retail facilities, institutional transportation, and hospitality and entertainment venues. Other areas of specialty design include lighting, codes, universal design, adaptive reuse, product design or product representation.

Opportunities for NDSU graduates vary according to the geographic area of practice and the responsibilities of specific positions. Recent graduates have accepted entry-level positions with starting salaries as high as $50,000 (Minneapolis).

Extra-Curricular Opportunities

NDSU students participate locally in the student chapter of the American Society of Interior Designers (ASID). Students also have the opportunity to participate in the North Dakota Interior Designers (NDID) organization. A number of professionals visit campus each year to present programs and informational seminars to students. Trips are planned to design studios, architectural firms and product markets to supplement course work. NDSU interior design students are encouraged to enter design competitions and have experienced a very high success rate.

The Facilities

NDSU facilities and instructional amenities are among the finest in the Upper-Midwest. The Interior Design Resource Center is well equipped with current samples and a virtual product library. Studios provide individual workstations and tools necessary to complete successful design solutions.

The Faculty

NDSU faculty hold terminal degrees in interior design or related fields and have been selected because of their individual and collective experience as interior designers and their commitment to teaching. All hold memberships in professional design-related organizations.

Introductory Curriculum

A suggested curriculum is provided. Other general education combinations are possible, but the eight sequential semesters beginning with the fall term of interior design courses cannot vary from this plan. Students who plan to transfer to NDSU should contact the Interior Design Program Coordinator for guidance in selecting courses before or during the first-year sequence.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman							
Fall	**Credits**		**Spring**	**Credits**			
ID 151		3	ID 160	1			
ID 161		3	ID 261	3			
ENGL 110		3	ID 265	3			
Gen Ed Soc & Behav Sci/Cult Div		3	COMM 110	3			
Gen Ed Wellness		2	ENGL 120	3			
			Gen Ed Quantitative Reasoning	3			
		14		**16**			
Sophomore							
Fall	**Credits**		**Spring**	**Credits**			
ID 251		3	ID 253	3			
ID 264		2	ID 363	3			
CSCI 114 or TL 116		3	ID 368	4			
ART 111, 210, 211, ARCH 321, or ARCH 322 (Choose one)		3	Minor Course	3			
Gen Ed Sci & Tech w/Lab		4	Gen Ed Sci & Tech	3			
		15		**16**			
Junior							
Fall	**Credits**		**Spring**	**Credits**	**Summer**	**Credits**	
ID 315		3	ID 316	3	ID 496	3	
ID 351		3	ID 353	3			
ID 460		3	ID 462	1			
ID 461		3	Gen Ed Soc & Behav Sci[1]	3			
ID 451[1] class may be repeated		2	Minor Course	3			
			Minor Course	3			
		14		**16**		**3**	
Senior							
Fall	**Credits**		**Spring**	**Credits**			
ID 450		3	ID 452	6			
Gen Ed Upper Division Writing		3	Minor Course	3			
Minor Course		3	Minor Course	3			
Minor Course		3	Minor Course	3			
		12		**15**			

Total Credits: 121

1

Student should take a Global Perspectives if ART 111 was not completed.

Program Note:

Minor Options: One of the following minors is required: Art; Business; Apparel, Retail Merchandising and Design; Spanish; Communication; History; Gerontology; Emergency Management; Natural Resource Management; other minor options may be approved by interior design faculty.(Total Credits required to complete minors will vary).

Interior Design

Department Information

- **Department Web Site:**
  https://www.ndsu.edu/adhm/interior_design/overview/
- **Credential Offered:**
  B.A.; B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/programs-study/undergraduate/interior-design/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/interior-design/#planofstudytext)

Major Requirements

Major: Interior Design

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Students must maintain a 3.00 cumulative GPA and a minimum grade of 'C' in all major core requirements.

Code	Title	Credits
Interior Design Core Requirements		
ID 151	Design Fundamentals	3
ID 160	Interior Design Careers	1
ID 161	Technical and Graphic Communications	3
ID 251	Residential Studio	3
ID 253	Small Scale Contract Studio	3
ID 261	Visual Communications	3
ID 264	Residential Systems	2
ID 265	CADD for Interiors	3
ID 315	History of Interiors I ((May satisfy general education category A))	3
ID 316	History of Interiors II ((May satisfy general education category A))	3
ID 351	Advanced Residential Studio	3
ID 353	Large Scale Contract Design Studio	3
ID 363	Commercial Lighting Design and Building Systems	3
ID 368	Interior Materials	4
ID 450	Research and Project Development in Interior Design	3
ID 451	Professional Interior Design Seminar	2
ID 452	Comprehensive Interior Design Project	6
ID 460	Career Development and Professional Practice	3
ID 461	Building Information Modeling	3
ID 462	Pre-Internship Development	1
ID 496	Field Experience	3
CSCI 114	Computer Applications	3
or TL 116	Business Software Applications	
Select ONE of the following:		3
ART 111	Introduction to Art History	
ART 210	Art History I	
ART 211	Art History II	
ARCH 321	History and Theory of Architecture I	
ARCH 322	History and Theory of Architecture II	
Minor Program of Study Required		
One of the following minors is required: Art; Business; Apparel, Retail Merchandising and Design; Foreign Language (French, German, Spanish); History; Gerontology; Emergency Mangement; Psychology, Natural Resource Managment; other minor options may be approved by interior design faculty. (Total credits required to complete minors will vary).		16
Total Credits		**83**

Degree Requirements and Notes

- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

Journalism

Department Information

- **Department Web Site:**
  www.ndsu.edu/communication/ (http://www.ndsu.edu/communication/)
- **Credential Offered:**
  B.S.; B.A.; Minor

- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/journalism/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/journalism/)

Journalism is one of four majors offered by the Department of Communication. Students are trained in both print and broadcast journalism. The program has a strong emphasis on cross-platform reporting and multi-media storytelling.

Why Choose a Major in the Department of Communication?

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

As a Journalism major, you will get:

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

Journalism Major

Students majoring in journalism may earn a Bachelor of Arts degree (with intermediate-level language proficiency) or a Bachelor of Science degree (with recommended minor or certificate).

Admission to the Major

Students are admitted to the journalism major after completing 18 credits of pre-communication courses: COMM 110, COMM 112, COMM 114, COMM 212, COMM 220, and ENGL 120.

Internship Requirement

Internships offer practical experience for journalism students. Three credits (120 hours) of field experience are required for the major, and many students complete more than one internship. Students have interned with a variety of media companies in the Fargo-Moorhead area and beyond. Internships often lead to jobs.

Career Opportunities

Coursework in the journalism major prepares students for careers in news reporting, media writing, broadcast writing, and broadcast production. The courses emphasize written and oral communication skills and prepare students to communicate in meaningful and effective ways with a variety of audiences.

Extra-Curricular Activities

Students majoring in journalism are encouraged to gain additional experience by working with the Bison Information Network (television), KNDS-96.9 (radio), or The Spectrum (print). NDSU has two honoraries for top students majoring in a degree program offered by the Department of Communication. Pi Kappa Delta is a national honor fraternity for students involved in human communication activities. Lambda Pi Eta is a national honorary for communication majors with high academic achievement.

High School Preparation

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

Scholarships

The Department of Communication awards a number of scholarships to students who excel in academics and who have demonstrated career potential. Applications are due by March 1. Visit **the department website** for details.

The Faculty

Faculty members in the Department of Communication are dedicated teachers, scholars, and practitioners who are committed to providing high-quality courses, hands-on learning experiences, and opportunities for undergraduate research.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 101	1	COMM 110	3
COMM 112	3	COMM 200	3
COMM 114	3	ENGL 120	3
ENGL 110 (or placement)	3	Gen Ed Hum/FA & Cultural Diversity	3
Gen Ed Quantitative Reasoning	3	Gen Ed Sci & Tech w/ Lab	4
Gen Ed Wellness	2		
	15		**16**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 212	3	COMM 320	3
COMM 220	3	Major Elective	3
Minor or Language Coursework	3	Minor or Language Coursework	3
Gen Ed Sci & Tech	3	Gen Ed Hum/FA & Glob Persp	3
Free Elective	3	Gen Ed Sci & Tech	3
	15		**15**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 310	3	Major Elective	3
COMM 496	3	Major Elective	3
Gen Ed Upper Division Writing	3	Free Electives	9
Major Elective	3		
Free Elective	3		
	15		**15**
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 431	3	COMM 465	3
Major Elective	3	Major Elective	3
Major Elective	3	Free Electives	8
Free Electives	6		
	15		**14**

Total Credits: 120

Journalism

Department Information

- **Department Web Site:**
  www.ndsu.edu/communication/ (http://www.ndsu.edu/communication/)
- **Credential Offered:**
  B.S.; B.A.; Minor

- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/journalism/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/journalism/#planofstudytext)

Major Requirements

Major: Journalism

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major requirements

Code	Title	Credits
Pre-Communication Requirements		
Students must complete the following 18 credits of coursework to be admitted to the major.		
ENGL 120	College Composition II	3
COMM 110	Fundamentals of Public Speaking	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3

COMM 220	Persuasion	3
Journalism Major Requirements		
COMM 101	Majors and Careers in Communication	1
COMM 200	Introduction to Media Writing	3
COMM 310	Advanced Media Writing	3
COMM 320	Communication Research Methods	3
COMM 431	Communication Ethics and Law	3
COMM 465	Convergence Media	3
COMM 496	Field Experience	3
Select one from the following for upper division writing requirement:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 322	Writing and the Creative Process	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 326	Writing in the Design Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Electives		
Complete 21 credits of courses with COMM prefix. Electives can include COMM classes, independent studies, and credit for work with student media organizations. Electives should be selected in consultation with an advisor to correspond with career interests. Up to 3 additional credits of COMM 496 can be counted toward major electives.		21
Total Credits		**61**

Minor Requirements

Minor: Journalism

Required Credits: 21

Code	Title	Credits
COMM 112	Understanding Media and Social Change	3
COMM 200	Introduction to Media Writing	3
COMM 245	Introduction to Video Production	3
or COMM 310	Advanced Media Writing	
Professional Specialization Electives:		**12**
COMM 245	Introduction to Video Production	
COMM 310	Advanced Media Writing	
COMM 313	Multimedia Editing	
COMM 330	Photography for the Media	
COMM 347	Television On-Air Performance	
COMM 362	Principles of Design For Media	
COMM 421	History of Journalism	
COMM 445	Advanced Video Production	
COMM 465	Convergence Media	
Total Credits		**21**

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.

Landscape Architecture

Department Information

- **Department Web Site:**
  www.ndsu.edu/landscapearchitecture/ (http://www.ndsu.edu/landscapearchitecture/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/landscape-architecture/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/landscape-architecture/)

The landscape architecture minor is a project-based course of study introducing students to designing outdoor spaces. The core courses cover topics from architectural drawing fundamentals, the history of Landscape Architecture, digital tools, and an intensive design studio where you apply this knowledge to a garden or park project. This minor aligns most closely with horticulture, interior design, and architecture but is open to all majors.

Landscape Architecture

Department Information

- **Department Web Site:**
  www.ndsu.edu/landscapearchitecture/ (http://www.ndsu.edu/landscapearchitecture/)
- **Credential Offered:**
  Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/landscape-architecture/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/landscape-architecture/#planofstudytext)

Minor Requirements

Minor: Landscape Architecture

Required Credits: 21

Code	Title	Credits
Core Courses		
ENVD 102	Drawing Basics for Environmental Designers	1
ENVD 104	Environmental Design Fundamentals	1
ENVD 130	Drawing Skills for Environmental Designers	3
ENVD 172	Environmental Design Fundamentals Studio	3
LA 231	Digital Media + Methods Technology	3
LA 321	History of Landscape Architecture	4
LA 271	Landform + Spacemaking Design Studio	6
Total Credits		**21**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU

Large Animal Veterinary Technology

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/ansc/ (http://www.ag.ndsu.edu/ansc/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/large-animal-veterinary-technology/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/large-animal-veterinary-technology/)

The Large Animal Veterinary Technology minor is a unique opportunity for veterinary technology students to expand their learning in the area of livestock species and horses. This minor allows for a great deal of flexibility in course selection to meet the needs and interests of the individual student. Coursework focuses on topics such as livestock production, reproduction, and animal behavior. This minor is reserved for veterinary

technology majors only. Students may earn this minor by completing a minimum of 16 credits. A minimum of eight credits must be completed at NDSU.

Large Animal Veterinary Technology

Department Information

- **Department Web Site:**
  www.ag.ndsu.edu/ansc/ (http://www.ag.ndsu.edu/ansc/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/large-animal-veterinary-technology/ (http://catalog.ndsu.edu/programs-study/undergraduate/large-animal-veterinary-technology/)

Minor Requirements

Minor: Large Animal Veterinary Technology

Minimum Credits: 16

Code	Title	Credits
Required Courses		
ANSC 220	Livestock Production	3
ANSC 260	Introduction to Equine Studies	2
ANSC 463	Physiology of Reproduction	3
ANSC 463L	Physiology of Reproduction Laboratory	1
VETS 482L	Large Animal Techniques Laboratory	1
Elective Courses:		
Select 6 credits from the following:		6
AGEC 242	Introduction to Agricultural Management	
ANSC 260L	Equine Care and Management Practicum	
ANSC 261	Basic Equitation & Horsemanship	
ANSC 300	Domestic Animal Behavior and Management	
ANSC 312	Bovine Pregnancy Diagnosis and Ultrasonography	
ANSC 323	Fundamentals of Nutrition	
ANSC 360	Equine Nutrition	
ANSC 393	Undergraduate Research (Undergraduate Research)	
ANSC 475	One Health	
VETS 396	(Large Animal Internship) [1]	
Total Credits		**16**

1

Must be approved by department advisor.

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.

Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  B.S.

- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/management/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/management/)

The management curriculum has been carefully designed to inspire and enable students to meet the demand of today's business and organizational landscapes. Management is an exciting and ever-developing field, and our students are supported by curriculum that fosters critical thinking, interpersonal and communication skills, leadership, analytic skills, and global awareness. A success measure of our management program is the successful placement of our graduates in business, industry, and non-profit organizations, in tandem with their enhanced abilities to plan, organize, work as a team, and make sound decisions.

Background Information

The Association to Advance Collegiate Schools of Business (AACSB International) accredits the undergraduate and graduate programs in the College of Business at North Dakota State University (NDSU). Our College of Business is one of only two AACSB-accredited schools of business in North Dakota.

AACSB International is one of higher education's most prestigious and rigorous accrediting bodies, emphasizing a commitment to continuous improvement, innovation, engagement, and impact in business education. Less than 10 percent of business programs worldwide have this accreditation, highlighting the academic excellence of our College of Business at NDSU.

The Program

The Management major is a four-year program with a curricular blend of general education, pre-major course work, fundamental business knowledge (accounting, finance, management, marketing, and information systems), international exposure, and in-depth management-specific courses. Students pursuing a Management major can also choose the Human Resource Management track or Supply Chain Management track to advance their field-specific skills and knowledge. The program nurtures important business skills and managerial competencies including planning, organizing, problem-solving, analytical ability, communication, teamwork, and leadership. Management students are thus prepared to lead and perform in evolving landscapes of business enterprises and non-profit organizations.

Selective Admission

Students who wish to study management at NDSU enroll as pre-management students in the College of Business for the first semester of their freshman year. Admission to the major requires the successful completion of the pre-major course requirements (ENGL 120, COMM 110, MATH 144, ECON 201 or 202, and PSYC 111 or SOC 110) and a minimum cumulative grade point average (GPA) of 2.50. Transfer students may also be eligible for immediate admission in the major. Contact a College of Business professional advisor for more information.

The Faculty

To provide a rigorous and relevant educational experience to our students, faculty in our program are highly qualified in their respective areas of expertise. Our faculty have been recognized for their teaching excellence by their students and colleagues and for their outstanding research by their peers. They employ a wide variety of instructional techniques and embed both classical and cutting-edge knowledge into their classes. They remain current in their fields by actively engaging in research and/or with firms and business professionals regarding their management practice, business challenges and issues.

The Practicum/Internship

Management majors are encouraged to complete practicum experiences, ideally at the end of sophomore and junior years. The practicum is designed to enable our students to connect management concepts learned in the classroom with live business situations and to broaden their horizons beyond the classroom setting. The practicum also gives students a competitive edge in job placement.

Career Opportunities

Graduates with a management major have career opportunities in business, industry, government service, and the non-profit sector, both regionally and globally. Employment opportunities for management majors are significant as the management function exists in every type of business and organization, whether manufacturing or service, small- or large-sized, for-profit or not-for-profit. Major job categories include human resources, supply chain/operations, project management, product/service management, and general management.

The College

In addition to the management major, the College of Business offers undergraduate majors in accounting, business administration, finance, global business (second major only), marketing, management information systems, and supply chain management, as well as several minors and certificates. Full details about minors and certificates can be found at https://www.ndsu.edu/business/programs/undergraduate/. The College of Business also offers six graduate programs including Master of Business Administration, MBA in Agribusiness, Master of Accountancy, Master of Science in Business Analytics, Master of Supply Chain Management, and a Doctorate in Transportation and Logistics, as well as several graduate certificates. Full details about graduate certificate programs can be found at https://www.ndsu.edu/business/programs/graduate/graduate_certificates/.

High School Preparation

It is recommended that high school students interested in studying management at the university level take mathematics courses at least through pre-calculus. High school electives in the social sciences, communication, and English also would be beneficial. Students who have satisfactorily completed Advanced Placement courses in Calculus, Economics, English, Communication, and Psychology or Sociology may be immediately eligible for admission to the major. Please speak with a professional advisor in the College of Business for more information.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110		3	COMM 110	3
MATH 144		4	ENGL 120	3
PSYC 111		3	TL 116	3
ECON 201		3	ECON 202	3
Gen Ed Wellness		2	Gen Ed Science & Technology	3
		15		**15**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
ACCT 200		3	ACCT 201	3
SOC 110		3	STAT 331	2
PHIL 216		3	Gen Ed Science & Technology w/Lab	4
STAT 330		3	Gen Ed Cultural Diversity	3
Gen Ed Humanities & Fine Arts		3	Free Elective or Track Elective	3
		15		**15**
Junior				
Fall	**Credits**		**Spring**	**Credits**
ENGL 320		3	MGMT 330	3
FIN 320		3	MGMT 450	3
MGMT 320		3	MIS 320	3
MRKT 320		3	300-400 Level CoB Elective	3
BUSN 430		3	Free Elective or Track Elective	3
		15		**15**
Senior				
Fall	**Credits**		**Spring**	**Credits**
SCM 460		3	BUSN 489	3
300-400 Level Management Electives (2)		6	300-400 Level Management Electives (2)	6
300-400 Level CoB Elective		3	300-400 Level CoB Elective	3
Free Elective or Track Elective		3	300-400 Level Elective	3
		15		**15**

Total Credits: 120

Note: Management majors can pursue a human resource management track and/or a supply chain management track as part of their program, provided that the 300-400 level business, management, and free electives taken meet the track(s) requirements.

Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/management/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/management/#planofstudytext)

Major Requirements

Major: Management

Degree Type: B.S.
Minimum Credits Required for Degree: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

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Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
All courses taken for the Management Major require a grade of C or better. A minimum 2.5 cumulative GPA is required for admission to the pre-major program, to enroll in 300-400 level courses, and to graduate.		
Pre-Major Requirements		
COMM 110	Fundamentals of Public Speaking	3
ECON 201	Principles of Microeconomics	3
or ECON 202	Principles of Macroeconomics	
ENGL 120	College Composition II	3
MATH 144	Mathematics for Business	4
PSYC 111	Introduction to Psychology	3
or SOC 110	Introduction to Sociology	
Management Major Requirements		
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
TL 116	Business Software Applications	3
PHIL 216	Business Ethics	3
STAT 330	Introductory Statistics	3
STAT 331	Regression Analysis	2
ECON 201	Principles of Microeconomics [1]	3
or ECON 202	Principles of Macroeconomics	
PSYC 111	Introduction to Psychology [1]	3
or SOC 110	Introduction to Sociology	
ENGL 320	Business and Professional Writing	3
Admission to major program required prior to taking the following courses:		
FIN 320	Principles of Finance [2]	3
MGMT 320	Foundations of Management [2]	3
MRKT 320	Foundations of Marketing [2]	3
MIS 320	Management Information Systems [2]	3
BUSN 430	Legal and Social Environment of Business [2]	3
BUSN 489	Strategic Management (Capstone Course) [2]	3
MGMT 330	Foundations of Organizational Behavior	3
MGMT 450	Human Resource Management	3
SCM 460	Production & Operations Management	3
Management 300-400 Elective Courses		
A. Select 300-400 level courses from current MGMT prefix courses. [3]		12
B. Select 300-400 level courses from within the College of Business prefixes: BUSN, MRKT, FIN, ACCT, MIS, ENTR (includes courses cross-listed with CoB courses) as well as SCM 320 and SCM 462. [3]		9
C. This 300-400 level elective can be external to the CoB and must be satisfied with a single 3-credit 300-400 level course (includes courses cross-listed with CoB courses). It cannot be used to satisfy other requirements. [3]		3
3: At least one of the following international courses must be included in the plan of study and can count in one of the managment 300-400 level elective areas (A, B, or C):		
BUSN 340	International Business	
ENTR 440	International Entrepreneurship (Prereq: ENTR 201 or MGMT 470)	
BUSN 341	Global Business Environment	
FIN 440	International Finance	
MGMT 440	International Management	
MRKT 440	International Marketing	
Total Credits		**93**

1

Take the other course not taken for the pre-major requirement.

2

Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and NoteS

- Students follow the published curricula for the management program of study from the semester/year of entrance in the College of Business (CoB) to graduation provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major are subject to meeting the curricular requirements in effect at the time the new major is declared.
- The CoB accepts a maximum of up to (but not including) 50% of upper-division (300-level and 400-level) business courses[1] required for degree completion, with a minimum grade of C[2]. All transfer courses are subject to approval by the course discipline chair or designated representative.
  a. Defined as courses with the following prefixes: ACCT, BUSN, ENTR, FIN, MGMT, MIS, MRKT, SCM
  b. Credits that do not qualify for degree completion will still be accepted as general credits toward graduation, within the restrictions defined by university transfer policy.
- A grade of 'C' or better is required in transfer courses accepted for all accounting, business administration, finance, management, management information systems, and marketing courses.
- No courses for the major may be taken with Pass/Fail grading.
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- Students must be accepted to the Management major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- A Business Administration minor is NOT offered with this major.
- For multiple majors within the CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.
- Internship and cooperative education credits may be applied toward the total credits required for graduation as non-major electives or 300-400 level electives not used in pre-major categories.
- Student may choose to take the Human Resource Management Track or the Supply Chain Management Track within the Management major:

Human Resources Management Track

Code	Title	Credits
MGMT 452	Compensation Management	3
Select two of the following:		6
MGMT 451	Negotiations	
MGMT 453	Understanding and Managing Diversity in Organizations	
MGMT 454	Labor-Management Relations	
Total Credits		**9**

Supply Chain Management Track

Code	Title	Credits
SCM 320	Integrated Supply Chain Management	3
SCM 462	Modeling the Supply Chain	3
Select one of the following:		3
AGEC 378	Introduction to Transportation & Logistics	
MGMT 451	Negotiations	
MRKT 430	Sales and Personal Selling	
MRKT 438	Customer Relationship Management (CRM) and Sales Technology	
MRKT 460	Marketing Strategy	
SCM 460	Production & Operations Management	
Total Credits		**9**

Management Communication

Department Information

- **Department Web Site:**
  www.ndsu.edu/communication/ (http://www.ndsu.edu/communication/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Official Program Curriculum:**

catalog.ndsu.edu/undergraduate/program-curriculum/management-communication/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/management-communication/)

Management Communication is one of four majors offered by the Department of Communication. Students study various communication techniques necessary for success in the workplace, including organizational communication, risk and crisis communication, leadership communication, team-based communication, and conflict communication.

Why Choose a Major in the Department of Communication?

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

As a Management Communication major, you will get:

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

Management Communication Major

A major in management communication trains students to be effective managers and leaders in corporate or non-profit environments. Students will complete an applied capstone course in their final semester. Students majoring in management communication may earn a Bachelor of Arts degree (with intermediate-level language proficiency) or a Bachelor of Science degree (with recommended minor or certificate).

ADMISSION TO THE MAJOR

Students are admitted to the management communication major after completing 18 credits of pre-communication courses: COMM 110, COMM 112, COMM 114, COMM 212, COMM 220, and ENGL 120.

Internship Requirement

Internships offer practical experience for management communication students. Three credits (120 hours) of field experience are required for the major, and many students complete more than one internship. Students have interned with a variety of private companies, non-profit organizations, and government agencies. Internships often lead to jobs.

Career Opportunities

Coursework in the management communication major prepares students for careers in college admissions, corporate training, consulting, human resource administration, organizational communication, and project management. The coursework emphasizes written and oral communication skills and prepares students to communicate in meaningful and effective ways with a variety of audiences.

Extra-Curricular Activities

Students majoring in management communication are encouraged to join the Management Communication Club for undergraduate research and consulting opportunities. They may also be interested in joining the department's chapter of the Public Relations Student Society of America (PRSSA). NDSU has two honoraries for top students majoring in a degree program offered by the Department of Communication. Pi Kappa Delta is a national honor fraternity for students involved in human communication activities. Lambda Pi Eta is a national honorary for communication majors with high academic achievement.

High School Preparation

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

Scholarships

The Department of Communication awards a number of scholarships to students who excel in academics and who have demonstrated career potential. Applications are due by March 1. Visit **the department website** for details.

The Faculty

Faculty members in the Department of Communication are dedicated teachers, scholars, and practitioners who are committed to providing high-quality courses, hands-on learning experiences, and opportunities for undergraduate research.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 101	1	COMM 110	3
COMM 112	3	ENGL 120	3
COMM 114	3	Major Elective	3
ENGL 110	3	Gen Ed Hum & Fine Arts/Cult Div	3
Gen Ed Quantitative Reasoning	3	Gen Ed Science/Technology w/Lab	4
Gen Ed Wellness	2		
	15		**16**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 212	3	COMM 315	3
COMM 220	3	COMM 320	3
Gen Ed Hum & Fine Arts/Glob Perspec	3	Gen Ed Science/Technology	3
Gen Ed Science/Technology	3	Free Electives	6
Free Elective	3		
	15		**15**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 383	3	COMM 496	3
Major Elective	3	Major Elective	3
Upper Division Writing	3	Major Elective	3
Free Electives	6	Free Electives	6
	15		**15**
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 431	3	COMM 483	3
Major Elective	3	Major Elective	3
Free Elective	9	Major Elective	3
		Free Electives	5
	15		**14**

Total Credits: 120

Management Communication

Department Information

- **Department Web Site:**
  www.ndsu.edu/communication/ (http://www.ndsu.edu/communication/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/management-communication/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/management-communication/#planofstudytext)

Major Requirements

Major: Management Communication

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Pre-Communication Requirements		
Students must complete the following 18 credits of coursework to be admitted to the major.		
ENGL 120	College Composition II	3

COMM 110	Fundamentals of Public Speaking	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3
COMM 220	Persuasion	3
Management Communication Major Requirements		
COMM 101	Majors and Careers in Communication	1
COMM 315	Small Group Communication	3
COMM 320	Communication Research Methods	3
COMM 383	Organizational Communication I	3
COMM 431	Communication Ethics and Law	3
COMM 483	Organizational Communication II	3
COMM 496	Field Experience	3
Select one from the following for upper division writing requirement:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 322	Writing and the Creative Process	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 326	Writing in the Design Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Electives		
Select 21 credits from the following:		21
COMM 216	Intercultural Communication	
COMM 308	Business and Professional Speaking	
COMM 316	Conflict Communication	
COMM 318	Argumentation and Advocacy	
COMM 412	Gender and Communication	
COMM 442	Digital Media and Society	
COMM 450	Issues in Communication	
COMM 484	Organizational Advocacy and Issue Management	
COMM 485	Risk and Crisis Communication	
COMM 487	Organizational Power and Leadership	
PSYC 221	Psychology Applied to Work	
SOC 233	Sociology of Organizations and Work	
Total Credits		**61**

Minor Requirements

Minor: Management Communication

Required Credits: 21

Code	Title	Credits
COMM 212	Interpersonal Communication	3
COMM 383	Organizational Communication I	3
COMM 483	Organizational Communication II	3
Professional Specialization Electives:		**12**
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	
COMM 316	Conflict Communication	
COMM 318	Argumentation and Advocacy	

COMM 412	Gender and Communication
COMM 450	Issues in Communication
COMM 484	Organizational Advocacy and Issue Management
COMM 485	Risk and Crisis Communication
COMM 487	Organizational Power and Leadership
Total Credits	**21**

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.

Management Information Systems

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  B.S.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/management-information-systems/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/management-information-systems/)

The management information systems (MIS) program is designed for those students who wish to prepare themselves for professional careers in information processing or information systems in business and government. The program develops technical skills and administrative insights required for the design, analysis, development, implementation, maintenance, and management of organizational information systems.

Background Information

MIS emphasizes the collection, organization, analysis, and dissemination of information for the planning and control of organizational operations. The program prepares graduates to manage various forms of information technology that are used at all levels of operations. The student learns how to analyze, design, implement, and manage information technology and computer systems in innovative ways to increase the effectiveness and efficiency of an organization.

Another objective of the program is to provide students with both theoretical knowledge and hands-on experience. The program requires a practicum. Practical experience enables graduates to become productive in any setting more quickly. Further, hands-on experience provides excellent motivation and concrete models for advanced course work. Graduates of the program find employment in a wide variety of settings.

The Program

North Dakota State University's MIS program is a unique collaborative effort by the faculty of two distinct disciplines: business administration and computer science. The Bachelor of Science degree provides sufficient background and skills to support a successful career in technical computing (e.g., as a programmer, systems analyst, systems designer, etc.), systems or network administration, database administration, information technology management, sales or technical sales support.

Selective Admission

Students who wish to study MIS at NDSU enroll as pre-MIS majors in the College of Business for the first semester of their freshman year. Pre-MIS majors are then admitted into the major after completing the pre-major courses (i.e., ENGL 120, COMM 110, MATH 144, ECON 201 or ECON 202, and PSYC 111 or SOC 110) with at least a C or higher and earning a cumulative GPA of at least 2.50. Transfer students with appropriate course work may be admitted directly into the major. Contact a professional advisor in the College of Business for more information.

Computing Facilities

The computer facilities at NDSU are among the best in the country. The Quentin Burdick Building (QBB) houses the academic host server for the North Dakota University System's 11 colleges and universities and their 48,000 students. Faculty, staff and students may use a variety of computing systems ranging from multi-user host systems to microcomputers, all connected on a 100 MB, full-duplex, fiber-optic high-speed campus network, a high-speed statewide network and then onto the Internet. The campus network is the largest network in the state, consisting of over 6,500 data ports in 35 buildings. Wireless access is available in most campus buildings, including residence halls, and in two outdoor green spaces.

Open access microcomputer labs are located in 26 buildings on the campus. These labs house 495 PCs and 65 Macintosh computers along with printers and scanners. Some of these labs are open 24 hours a day. The computers are equipped with the most commonly used software, e.g., Microsoft Office, Adobe Photoshop, AutoCad, SPSS, etc. Students can use these computers as stand-alone workstations, to access host systems, or to communicate via the Internet with other students and professionals throughout the world. These labs are open to all students at NDSU. All

residence halls are wired to the campus network, making it easy for students with computers to access remote information for course work and various investigations.

In addition to the open access microcomputer labs, the MIS program and the computer science department maintain two special-purpose labs housing approximately 170 computers for use by the students in their respective programs. These labs include a computer structures and networking laboratory, and a network and server laboratory.

NDSU has assumed a leadership role in computer networking as part of a six-state consortium for extremely high-level networking in the Upper Midwest and connectivity to the National Science Foundation supercomputer centers. NDSU is a charter member of Internet 2 and has connectivity with the national vBNS research network.

NDSU also houses a Center for High Performance Computing (CHPC) that provides access to secure, advanced scientific computing resources. The CHPC is a member of the Coalition of Academic Scientific Computation, a nonprofit organization of supercomputing centers and research universities that offer leading edge hardware, software, and expertise in high performance computing resources.

Career Opportunities

MIS professionals play a key role in an organization by managing various types of technology and information systems to increase the effectiveness and efficiency of the organization. As an MIS specialist, one might choose a job in business, education, research, agriculture, or government. This work may be in the technology-oriented areas such as systems analysis, database management, telecommunications/networks, and design and development of new computer systems, or in the business analytics areas such as data science and business data analysis. The Federal Bureau of Labor Statistics expects job opportunities in information systems to be a very attractive career path in the foreseeable future.

High School Preparation

It is recommended that high school students interested in studying MIS at the university level take the maximum number of math courses offered at the high school level. High school electives in the social sciences, English and communication also would be of benefit. Please speak with a professional advisor in the College of Business for more information.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman							
Fall	**Credits**		**Spring**	**Credits**			
ENGL 110		3	COMM 110	3			
TL 116		3	ENGL 120	3			
Gen Ed Hum & Fine Arts/Cult Div		3	PSYC 111 or SOC 110	3			
Free Electives		6	MATH 144	4			
			Free Elective	3			
		15		**16**			
Sophomore							
Fall	**Credits**		**Spring**	**Credits**			
ACCT 200		3	ACCT 201	3			
ECON 201		3	ECON 202	3			
STAT 330		3	PHIL 216	3			
Gen Ed Science & Tech		3	STAT 331	2			
Gen Ed Wellness		2	Gen Ed Science & Technology w/Lab	4			
		14		**15**			
Junior							
Fall	**Credits**		**Spring**	**Credits**	**Summer**	**Credits**	
MGMT 320		3	BUSN 430	3	MIS Practicum[1]	3	

MRKT 320		3	ENGL 320	3	
MIS 320		3	FIN 320	3	
MIS 315		3	MIS 450	3	
BA Track Programming Elective		3	MIS 375	3	
		15		**15**	**3**

Senior					
Fall	**Credits**		**Spring**	**Credits**	
MIS 340		3	SCM 460	3	
BUSN 380		3	MIS 376	3	
BUSN 489		3	MIS 470	3	
300-400 Level CoB Electives		6	MIS 479	3	
		15		**12**	

Total Credits: 120

1

Students must complete one of the following options: MIS 397 Cooperative Education, UNIV 492 Study Abroad, MIS 413 Service Internship, CSCI 445 Software Projects Capstone, MGMT 470 Entrepreneurship/Small Business Management or AGEC 371 Export Management. Requires MIS 320 as a pre-requisite and faculty advisor's prior approval.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman					
Fall	**Credits**		**Spring**	**Credits**	
ENGL 110		3	COMM 110	3	
TL 116		3	ENGL 120	3	
Gen Ed Humanities & Fine Arts/Cult Diversity		3	PSYC 111 or SOC 110	3	
Free Electives		6	MATH 144	4	
			Free Elective	3	
		15		**16**	

Sophomore					
Fall	**Credits**		**Spring**	**Credits**	
ACCT 200		3	ACCT 201	3	
ECON 201		3	ECON 202	3	
STAT 330		3	PHIL 216	3	
Gen Ed Science & Tech		3	STAT 331	2	
Gen Ed Wellness		2	Gen Ed Science & Technology (w/lab)	4	
		14		**15**	

Junior						
Fall	**Credits**		**Spring**	**Credits**	**Summer**	**Credits**
MGMT 320		3	BUSN 430	3	MIS Practicum[3]	3
MRKT 320		3	ENGL 320	3		

MIS 320	3	FIN 320	3	
MIS 315	3	MIS 450	3	
IT Track Programming Elective[1]	3	IT Track Programming Elective[2]	3	
	15		**15**	**3**

Senior				
Fall	**Credits**	**Spring**	**Credits**	
CSCI 312	3	SCM 460	3	
BUSN 489	3	MIS 376	3	
IT Track Technology Electives	6	MIS 470	3	
300-400 Level Business Elective	3	MIS 375	3	
	15		**12**	

Total Credits: 120

1

Recommended Programming Elective course: CSCI 227 or CSCI 160

2

Recommended Programming Elective course: CSCI 228 or CSCI 161

3

Students must complete one of the following options: MIS 397 Cooperative Education, UNIV 492 Study Abroad, MIS 413 Service Internship, CSCI 445 Software Projects Capstone, MGMT 470 Entrepreneurship/Small Business Management or AGEG 371 Export Management. Requires MIS 320 as a pre-requisite and faculty advisor's prior approval.

Management Information Systems

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  B.S.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/management-information-systems/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/management-information-systems/#planofstudytext)

Major Requirements

Major: Management Information Systems

Degree Type: B.S.
Minimum Credits Required for Degree: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Pre-Major Requirements

Code	Title	Credits
COMM 110	Fundamentals of Public Speaking	3
ENGL 120	College Composition II	3
ECON 201	Principles of Microeconomics [2]	3
or ECON 202	Principles of Macroeconomics	
MATH 144	Mathematics for Business	4
PSYC 111	Introduction to Psychology	3
or SOC 110	Introduction to Sociology	
Total Credits		**16**

Major Requirements

Code	Title	Credits
Core Requirements		
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
ECON 201	Principles of Microeconomics [2]	3
or ECON 202	Principles of Macroeconomics	
TL 116	Business Software Applications	3
PHIL 216	Business Ethics	3
STAT 330	Introductory Statistics	3
STAT 331	Regression Analysis	2
ENGL 320	Business and Professional Writing	3
Admission to the major program is required prior to taking the following courses:		
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 [1]	3
SCM 460	Production & Operations Management	3
MIS 320	Management Information Systems	3
MIS 315	System Analysis and Design	3
MIS 450	Enterprise Systems	3
MIS 375	Database Design for Business Application	3
MIS 376	Data and Telecommunications Administration	3
MIS 470	Information Systems	3
Track: Select one track to complete the major: Information Technology or Business Analytics		
Students must select either the Information Technology Track or the Business Analytics Track to complete the MIS major requirements.		21-23
Total Credits		**80-82**

Information Technology Track

Code	Title	Credits
CSCI 312	Survey of Programming Languages	3
Programming Electives - Select two from the following (recommended CSCI 160 or CSCI 227; CSCI 161 or CSCI 228)		6-8
CSCI 160	Computer Science I	
CSCI 122	Visual BASIC	
CSCI 161	Computer Science II	
CSCI 172	Intermediate Visual BASIC	
CSCI 213	Modern Software Development	
CSCI 227	Computing Fundamentals in Python I	
CSCI 228	Computing Fundamentals in Python II	
CSCI 371	Web Scripting Languages	
ECE 173	Introduction to Computing	
STAT 471	Introduction to the R Language	
Techology Electives - Select two courses; one must be 300-400 level		6
ACCT 420	Accounting Information Systems	
CSCI 213	Modern Software Development (If not used above in programming electives.)	
CSCI 345	Topics on Personal Computers	
CSCI 371	Web Scripting Languages (If not used above in programming electives.)	
CSCI 372	Comparative Programming Languages	
CSCI 428	Artificial Intelligence, Ethics, and the Environment	
CSCI 473	Foundations of the Digital Enterprise	
CSCI 489	Social Implications of Computers	
ECON 411	Computational Economics	
FIN 330	Data Analytics in Finance	
IME 456	Program and Project Management	
MRKT 465	Digital Marketing	
SCM 330	Supply Chain Analysis and Analytics	
STAT 469	Introduction to Biostatistics	
STAT 471	Introduction to the R Language (If not used above in programming electives.)	
Business Elective: Any 300-400 level CoB course not used to satisfy other major requirements, CSCI 473, or ECON 324. (Excludes internships, study abroad, LEAD courses & MIS 371; includes courses cross-listed with CoB courses).		3
Internship in IT - Students must complete one of the following options:		3
MIS 397	Fe/Coop Ed/Internship	
MIS 413	MIS Service Internship	
MGMT 470	Entrepreneurship/Small Business Management	
AGEC 371	Export Management	
Total Credits		**21-23**

Business Analytics Track

Code	Title	Credits
BUSN 380	Business Analytics: Business Problem Solving with Spreadsheets	3
MIS 340	Applied Business Intelligence	3
MIS 479	Business Data Mining and Predictive Analytics	3
Programming Elective - Select one course from the following:		3-4
CSCI 122	Visual BASIC	
CSCI 160	Computer Science I	
CSCI 172	Intermediate Visual BASIC	
CSCI 213	Modern Software Development	
CSCI 227	Computing Fundamentals in Python I	
CSCI 371	Web Scripting Languages	
ECE 173	Introduction to Computing	
STAT 471	Introduction to the R Language	
Business Elective: Any 300-400 level CoB course not used to satisfy other major requirements, CSCI 473, or ECON 324. (Excludes internships, study abroad, LEAD courses & MIS 371; includes courses cross-listed with CoB courses).		6
Internship in Business Analytics - Students must complete one of the following options:		3
MIS 397	Fe/Coop Ed/Internship	
MIS 413	MIS Service Internship	
MGMT 470	Entrepreneurship/Small Business Management	
AGEC 371	Export Management	
Total Credits		**21-22**

[1]

Denotes Common Body of Knowledge (CBK) course.

[2]

Students will complete one economics course for the pre-major and the other economics course once admitted to the major.

Degree Requirements and Notes

- All courses for the pre-major and major require a grade of C or better.
- Students follow the published curricula for the 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.
- The CoB accepts a maximum of up to (but not including) 50% of upper-division business courses* required for degree completion, with a minimum grade of C**. All transfer courses are subject to approval by the course discipline chair or designated representative.
  - * Defined as courses with the following prefixes: ACCT, BUSN, ENTR, FIN, MGMT, MIS, MRKT, SCM
  - ** Credits that do not qualify for degree completion will still be accepted as general credits towards graduation, within the restrictions defined by university policy.
- Students must earn a 2.50 institutional GPA to graduate.
- Admission to the MIS major is required to enroll in the advanced 300 or 400 level courses in the CoB.
- A letter grade must be earned in any course that fulfills a major requirement (with the exception of some practicum options).
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- Students must be accepted to the MIS major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- Students are not eligible for a Business Administration minor with this major.
- For multiple majors within the CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.
- Prerequisite for Management Information Systems Practicum: MIS 320 with a grade of C or better.

Minor Requirements

Minor: Management Information Systems

Required Credits: 18

Code	Title	Credits
Requirements		
TL 116	Business Software Applications	3

MIS 320	Management Information Systems	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	
Select any 300-400 level MIS course or one of the following:		3
ACCT 420	Accounting Information Systems	
CSCI 122	Visual BASIC	
CSCI 160	Computer Science I	
CSCI 161	Computer Science II	
CSCI 172	Intermediate Visual BASIC	
CSCI 213	Modern Software Development	
CSCI 227	Computing Fundamentals in Python I	
CSCI 228	Computing Fundamentals in Python II	
CSCI 312	Survey of Programming Languages	
Total Credits		**18**

Minor Requirements and Notes

- Students should refer to www.ndsu.edu/business (https://www.ndsu.edu/business/) for information on declaring the minor with the College of Business (CoB).
- To be accepted into the minor program, students must have a 2.50 institutional cumulative GPA. To complete a minor, students must earn at least a 2.50 GPA that is based on the courses used to satisfy the minor requirements. Courses may not be taken pass/fail.
- If the cumulative GPA falls below the 2.50 after acceptance into the program, the student will not be allowed to register for the CoB courses until the cumulative GPA returns to 2.50 or above.
- Students are subject to the minor requirements in effect during the year in which the minor was approved.
- Minors must satisfy all course prerequisites.
- Approval for a minor does not guarantee enrollment in specific courses.
- Graduation with a minor in Management Information Systems requires a grade of 'C' or better in all courses required for the minor.

Managerial Psychology

Department Information

- **Department Web Site:**
  www.ndsu.edu/psychology/ (http://www.ndsu.edu/psychology/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/managerial-psychology/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/managerial-psychology/)

The Department of Psychology offers a managerial psychology minor that fills the need of many students who want essential training in behavior relevant to management in organizations which would help them in their professional careers as well as personal lives. The minor follows a number of themes important for NDSU students' in their future working lives: (1) managerial behavior derived from learning self-management, (2) managerial behavior derived from knowing and understanding others, and their diversity, (3) learning the broad implications of psychology for working with others, (4) recognizing the judgment, problem solving, and decision making foundation of managerial behavior, and (5) developing an understanding of the intrapersonal, interpersonal and organizational contexts of managerial behavior.

Mangerial Psychology

Department Information

- **Department Web Site:**
  www.ndsu.edu/psychology/ (http://www.ndsu.edu/psychology/)
- **Credential Offered:**
  Minor

- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/managerial-psychology/ (http://catalog.ndsu.edu/programs-study/undergraduate/managerial-psychology/)

Minor Requirements

Minor: Managerial Psychology

Required Credits: 18

Code	Title	Credits
PSYC 111	Introduction to Psychology	3
PSYC 211	Introduction To Behavior Modification	3
or PSYC 311	Behavior Management and Change	
PSYC/SOC 214	Social Interaction	3
or PSYC 216	Cultural Psychology	
PSYC 221	Psychology Applied to Work	3
PSYC 322	Judgment & Decision-Making	3
PSYC 453	Organizational Psychology	3
or PSYC 457	Managing Work Motivation and Morale	
Total Credits		**18**

Minor Requirements and Notes

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

Manufacturing Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/ime/ (http://www.ndsu.edu/ime/)
- **Credential Offered:**
  B.S.Mfg.E.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/manufacturing-engineering/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/manufacturing-engineering/)

Manufacturing engineers play a vital role in shaping the world around us, as their work is intrinsically linked to the production of goods. In the routines of daily life, whether at home, work, or during moments of recreation, nearly every item encountered is a result of manufacturing. Defined professionally, manufacturing occurs when the shape, form, or properties of a material are altered in a way that adds value. Manufactured goods are everywhere: aircraft structures, machinery, electronics, medical devices, automobile parts, household products, toys, textiles and clothing, cans and bottles, among others. In essence, manufactured goods permeate every facet of daily existence.

The Profession

In the modern landscape, where everything relied upon is manufactured, businesses turn to manufacturing engineers for the design, direction, and coordination of processes that bring products to fruition. As industries try to improve products and lower costs, manufacturing engineers are at the forefront, applying scientific principles to enhance the productions of goods. They are key team members across diverse sectors, from automobiles and electronics to food products and recreational equipment, and more. In all cases, manufacturing engineers design the processes and systems to make products with the required functionality, to high quality standards, available when and where customers prefer, at the best possible price and in ways that are environmentally friendly.

The Program

Manufacturing engineering is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the commission's General Criteria and Program Criteria for Manufacturing and Similarly Named Engineering Programs. As graduates of the Manufacturing Engineering Program, individuals acquire the skills to design systems and processes that improve the quality and productivity of an organization's operations. Armed with a solid foundation in fundamental engineering and management principles, they effectively integrate people, technology, machines, and financial resources to create positive change, ensuring the optimal production of goods.

Motivated undergraduate students within the program have the opportunity to explore an accelerated degree path. The IME department offers an accelerated Master of Engineering program. The advantage to this non-thesis, project-based degree option lies in the application of pre-established

coursework at the 600 level to be applied to both degrees, offering a graduate degree in only one additional year beyond the undergraduate degree. The program includes 30 credits of graduate classes in addition to a written examination. To be eligible for admission to the graduate school and pursue the Master of Engineering accelerated program, students must have completed a minimum of 60 credits and maintained a cumulative GPA of 3.0 or higher.

Faculty and Facilities

Currently housed in the Engineering Building, part of an eight-building engineering complex, the department is equipped with seven laboratories designed for both teaching and research, catering to the diverse educational and research requirements of students. These specialized laboratories cover a range of areas including computer simulation, human factors, automation and robotics, additive manufacturing and biomanufacturing, computational modeling, bioinformatics and operations research, PLC's, manufacturing/fabrication processes, rapid prototyping, CNC machining, and microfabrication, as well as welding and precision manufacturing. In the fall of 2026, NDSU's College of Engineering is set to open the new Richard Offerdahl '65 Engineering Complex. This cutting-edge facility will feature state-of-the-art research and learning spaces, equipping future engineers to meet the ever-changing demands of both the University and industry for generations to come.

The IME faculty and staff members in the department have extensive experience in industrial and manufacturing specialties. The IME faculty and staff are dedicated to personally knowing each student, recognizing their strengths, understanding potential challenges, and providing support whenever necessary. Upon graduation from NDSU, students will have developed excellent capabilities for career success, the confident ability for lifelong personal growth, and a network of friends and professional colleagues.

Career Opportunities

The IME programs at NDSU open doors to diverse career opportunities or to seek advanced degrees at NDSU or another institution. The IME programs help students develop a strong base in general education and engineering fundamentals, providing the foundation for a wide range of career options and facilitate lifelong growth. These programs also equip students with industry-standard skills, opening doors to many career opportunities with financial rewards and professional success. Manufacturing engineering graduates have become a source of talent working in industries that produce such products as biomedical devices, transportation and construction equipment, and aircraft and spacecraft. Recent IME graduates earn starting salaries in the top rank of engineering disciplines. According to Payscale.com, the current national average starting salary for manufacturing engineers is $76, 452. (https://www.payscale.com/research/US/Job=Manufacturing_Engineer/Salary (https://www.payscale.com/research/US/Job=Manufacturing_Engineer/Salary/)).

Transfer Admission

Students who transfer with an AA or AS degree have lower-division general education credits satisfied.

Scholarship and Financial Aid

The Department of Industrial and Manufacturing Engineering offers several scholarships annually. Scholarships are available for incoming freshman, transfer students, and currently enrolled students. Other forms of financial aid are available through the Office of Financial Aid and Scholarships.

Selective Admission

Transfer students are required to have a minimum grade point average of 2.3.

MANUFACTURING Engineering Minor

Students majoring in any engineering discipline may elect a minor in Manufacturing Engineering. These optional studies offer engineering students the opportunity to add important career-enhancing skills to their technological competencies. The total requirement for the minor is 18 credits (12 credits are required courses and 6 credits are approved electives).

Sample Program Guide

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Freshman			
Fall	**Credits**	**Spring**	**Credits**
CHEM 121 & 121L	4	IME 111	3
ENGL 110	3	MATH 166	4
ENGL 120	3	ME 212	3
MATH 165	4	ME 221	3

Computer Sci Elective (Select from official curriculum guide)		3	CHEM 122		3
		17			**16**
Sophomore					
Fall	**Credits**		**Spring**	**Credits**	
COMM 110		3	IME 311		3
IME 330		3	MATH 266		3
MATH 128		1	PHYS 252 & 252L		5
MATH 259		3	ME 331		4
ME 222		3	CE 309		3
ME 223		3			
		16			**18**
Junior					
Fall	**Credits**		**Spring**	**Credits**	
IME 380		3	IME 431		3
IME 430		3	IME 440		3
IME 460		3	IME 461		3
ENGL 321		3	ME 350		3
IME 456		3	Gen Ed Hum & Fine Arts/Glob Persp		3
Gen Ed Wellness		2			
		17			**15**
Senior					
Fall	**Credits**		**Spring**	**Credits**	
IME 480		3	IME 489		3
IME 482		3	Engr Sci Elective (Select from official curriculum)		3
Gen Ed Social & Behavioral Sciences		3	Gen Ed Soc & Beh Sci/Cult Div		3
Tech Elective (Select from official curriculum guide)		3	Tech Elective (Select from official curriculum guide)		3
ENGR 327		3	Tech Elective (Select from official curriculum guide)		3
		15			**15**

Total Credits: 129

DEGREE NOTES:

- Grades less than 'C' will not be accepted for required courses in CHEM, MATH, and PHYS.
- Students may request approval for other 300-400 level engineering or related courses to be approved as technical electives. To request approval, a student should submit a request to the IME Department indicating the course of interest and why the course should be approved as a technical elective. This request 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.

Manufacturing Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/ime/ (http://www.ndsu.edu/ime/)
- **Credential Offered:**
  B.S.Mfg.E.; Minor

- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/manufacturing-engineering/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/manufacturing-engineering/#planofstudytext)

Major Requirements

Major: Manufacturing Engineering

Degree Type: B.S.Mfg.E.
Minimum Degree Credits to Graduate: 129

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Manufacturing Engineering Core Requirements		
IME 111	Introduction to Industrial and Manufacturing Engineering	3
IME 311	Work/Station Design and Measurement	3
IME 330	Manufacturing Processes	3
IME 380	CAD/CAM for Manufacturing	3
IME 430	Process Engineering	3
IME 431	Production Engineering	3

IME 440	Engineering Economy	3
IME 456	Program and Project Management	3
IME 460	Evaluation of Engineering Data	3
IME 461	Quality Assurance and Control	3
IME 480	Production and Inventory Control	3
IME 482	Automated Manufacturing Systems	3
IME 489	Industrial and Manufacturing Engineering Capstone	3
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
ME 212	Fundamentals of Visual Communication for Engineers	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
ME 331	Materials Science and Engineering	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122	General Chemistry II (May satisfy general education category S)	3
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
ENGR 327	Ethics, Engineering, and Technology	3
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
Manufacturing Electives		
Computer Science Electives: Select 3 credits from the following:		3
CSCI 122	Visual BASIC	
CSCI 159	Computer Science Problem Solving	
CSCI 160	Computer Science I	
CSCI 227	Computing Fundamentals in Python I	
ECE 173	Introduction to Computing	
Engineering and Science Electives: Select a minimum of 9 credits from the following:		
CE 309	Fluid Mechanics	3
ME 350	Thermodynamics and Heat Transfer	3
Select one of the following:		3-4
EE 206	Circuit Analysis I	
ECE 275	Digital Design	
ECE 301	Electrical Engineering I	
Technical Electives: Select 9 credits from the following:		**9**
IME 335	Welding Technology	
IME 411	Human Factors Engineering	
IME 427	Packaging for Electronics	
IME 432	Composite Materials Manufacturing	
IME 433	Additive Manufacturing	
IME 435	Plastics and Polymer Processing in Manufacturing	
IME 437	Methods for Precision Manufacturing	
IME 450	Systems Engineering and Management	
IME 451	Logistics Engineering and Management	
IME 453	Hospital Management Engineering	
IME 462	Total Quality In Industrial Management	
IME 463	Reliability Engineering	
IME 464	Reliability Analysis	

IME 465	Introduction to Machine Learning
IME 470	Operations Research I
IME 472	Simulation of Business and Industrial Systems
IME 485	Industrial and Manufacturing Facility Design
Only one of the following five courses may be counted as technical electives.	
BUSN 340	International Business
BUSN 431	Business Law I-Contracts, Property and Torts
MGMT 320	Foundations of Management
MRKT 320	Foundations of Marketing
MIS 320	Management Information Systems
Total Credits	**109-110**

Degree Requirements and Notes

- Grades less than 'C' will not be accepted for required courses in CHEM, MATH, and PHYS.
- Students may request approval for other 300-400 level engineering or related courses to be approved as technical electives. To request approval, a student should submit a memo to the IME Department indicating the course of interest and why the course should be approved as a technical elective. This memo will be reviewed by the IME Department Chair for approval.
- 300-400 level BUSN courses require at least junior standing and a minimum 2.50 cumulative GPA.

Minor Requirements

Minor: Manufacturing Engineering

Required Credits: 18

Code	Title	Credits
Required Courses		
IME 330	Manufacturing Processes	3
IME 380	CAD/CAM for Manufacturing	3
IME 430	Process Engineering	3
IME 431	Production Engineering	3
Electives: Select 6 credits from the following:		**6**
IME 335	Welding Technology	
IME 427	Packaging for Electronics	
IME 432	Composite Materials Manufacturing	
IME 433	Additive Manufacturing	
IME 435	Plastics and Polymer Processing in Manufacturing	
IME 437	Methods for Precision Manufacturing	
IME 461	Quality Assurance and Control	
IME 465	Introduction to Machine Learning	
IME 482	Automated Manufacturing Systems	
Total Credits		**18**

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.
- Only students majoring in an engineering discipline or with department permission agricultural or physical science majors may elect a minor in Manufacturing Engineering.

Marketing

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  B.S.

- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/marketing/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/marketing/)

Marketing is a primary function of organizations to ensure the needs of customers and external constituents are met. The marketing curriculum is carefully designed to ensure students have understanding of how to successfully manage products, price, place and promotion, and have analytical and interpersonal skills. A success measure of our marketing program is the successful placement of our graduates in business, industry, and non-profit organizations, in tandem with their enhanced abilities to manage marketing mix, analyze markets, work as a team, and make sound decisions.

Background Information

The Association to Advance Collegiate Schools of Business (AACSB International) accredits the undergraduate and graduate programs in the College of Business at North Dakota State University. Our College of Business is one of only two AACSB-accredited schools of business in North Dakota.

AACSB International is one of higher education's most prestigious and rigorous accrediting bodies, emphasizing a commitment to continuous improvement, innovation, engagement, and impact in business education. Less than 10 percent of business programs worldwide have this accreditation, highlighting the academic excellence of our College of Business at NDSU.

The Program

The Marketing major is a four-year program available in a traditional face-to-face format or fully online. It comprises a curricular blend of general education, pre-major course work, fundamental business knowledge (accounting, finance, management, marketing, and information systems), international exposure, and in-depth marketing-specific courses. Students in the Marketing major can also choose the Supply Chain Management track or pursue the Certificate in Professional Selling to advance their field-specific skills and knowledge. The program nurtures important business skills and marketing competencies including managing marketing mix (price, product, promotion, and place), analytical ability, interpersonal skills, and teamwork. Marketing students are thus prepared to perform the marketing function and activities in business enterprises and non-profit organizations.

Selective Admission

Students who wish to study marketing at NDSU enroll as pre-marketing students in the College of Business for the first semester of their freshman year. Admission to the major requires the successful completion of the pre-major course requirements (ENGL 120, COMM 110, MATH 144, ECON 201 or 202, and PSYC 111 or SOC 110) and a minimum cumulative grade point average (GPA) of 2.50. Transfer students may also be eligible for immediate admission in the major. Contact a College of Business professional advisor for more information.

The Faculty

To provide a rigorous and relevant educational experience to our students, faculty in our program are highly qualified in their respective areas of expertise. Our faculty have been recognized for their teaching excellence by their students and colleagues and for their outstanding research by their peers. They employ a wide variety of instructional techniques and embed both classical and cutting-edge knowledge into their classes. They remain current in their fields by actively engaging in research and/or with firms and business professionals regarding their marketing practice, business challenges and issues.

The Practicum/Internship

Marketing majors are encouraged to complete practicum experiences, ideally at the end of sophomore and junior years. The practicum is designed to enable our students to connect marketing concepts learned in the classroom with live business situations and to broaden their horizons beyond the classroom setting. The practicum also gives students a competitive edge in job placement.

Career Opportunities

Graduates with a marketing major have career opportunities in business, industry, government service, and the non-profit sector, both regionally and globally. Employment opportunities for marketing majors are significant as the marketing function exists in every type of business and organization, whether for-profit or not-for-profit. Major job categories include sales, retailing, product/service management, advertising and promotion, and market research.

High School Preparation

It is recommended that high school students interested in studying marketing at the university level take mathematics courses at least through pre-calculus. High school electives in the social sciences, communication, and English also would be beneficial. Students who have satisfactorily completed Advanced Placement courses in Calculus, Economics, English, Communication, and Psychology or Sociology may directly apply for admission to the major. Please speak with a professional advisor in the College of Business for more information.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110		3	COMM 110	3
MATH 144		4	ENGL 120	3
PSYC 111		3	TL 116	3
ECON 201		3	ECON 202	3
Gen Ed Wellness		2	Free Elective	3
		15		**15**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
ACCT 200		3	ACCT 201	3
SOC 110		3	STAT 331	2
PHIL 216		3	Gen Ed Science & Technology w/lab	4
STAT 330		3	Gen Ed Hum & Fine Arts/Cult Diversity	3
Gen Ed Science & Technology		3	Free Elective	3
		15		**15**
Junior				
Fall	**Credits**		**Spring**	**Credits**
ENGL 320		3	BUSN 430	3
FIN 320		3	MRKT 410	3
MGMT 320		3	MIS 320	3
MRKT 320		3	300-400 Level Marketing Elective	3
Free Elective		3	300-400 Level CoB Elective	3
		15		**15**
Senior				
Fall	**Credits**		**Spring**	**Credits**
MRKT 450		3	BUSN 489	3
300-400 Level Marketing Electives		3	MRKT 460	3
300-400 Level Marketing Electives		3	300-400 Level Marketing Elective	3
300-400 Level CoB Elective		3	300-400 Level CoB Elective	3
Free Elective		3	300-400 Level Elective	3
		15		**15**

Total Credits: 120

Note: Marketing majors can pursue a supply chain management track as part of their program, provided that the 300-400 level business, marketing, and free electives taken meet the track requirements.

Marketing

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/marketing/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/marketing/#planofstudytext)

Major Requirements

Major: Marketing

Degree Type: B.S.
Minimum Credits Required for Degree: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
All courses taken for the Marketing Major require a grade of C or better. A minimum 2.5 cumulative GPA is required for admission to the major program, to enroll in 300-400 level courses, and to graduate.		
Pre-Major Requirements		
COMM 110	Fundamentals of Public Speaking	3
ECON 201	Principles of Microeconomics [1]	3
or ECON 202	Principles of Macroeconomics	
ENGL 120	College Composition II	3
MATH 144	Mathematics for Business	4
PSYC 111	Introduction to Psychology [1]	3
or SOC 110	Introduction to Sociology	

Marketing Major Requirements		
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
TL 116	Business Software Applications	3
PHIL 216	Business Ethics	3
STAT 330	Introductory Statistics	3
STAT 331	Regression Analysis	2
ECON 201	Principles of Microeconomics [1]	3
or ECON 202	Principles of Macroeconomics	
PSYC 111	Introduction to Psychology [1]	3
or SOC 110	Introduction to Sociology	
ENGL 320	Business and Professional Writing	3
Admission to the major program required prior to taking the following courses:		
FIN 320	Principles of Finance [2]	3
MGMT 320	Foundations of Management [2]	3
MRKT 320	Foundations of Marketing [2]	3
MIS 320	Management Information Systems [2]	3
BUSN 430	Legal and Social Environment of Business [2]	3
BUSN 489	Strategic Management (Capstone Course) [2]	3
MRKT 410	Consumer Behavior	3
MRKT 450	Marketing Research	3
MRKT 460	Marketing Strategy	3
Marketing Elective Courses		
A. Select 300-400 level courses from current MRKT prefix courses. [3]		12
B. Select 300-400 level courses from within the CoB, Prefixes of BUSN, MGMT, FIN, ACCT, MIS, ENTR (includes courses cross-listed with CoB courses) as well as SCM 320, SCM 460, and SCM 462. [3]		9
C. This 300-400 level elective can be external to the CoB and must be satisfied with a single 3-credit 300-400 level course (includes courses cross-listed with CoB courses). It cannot be used to satisfy other requirements. [3]		3
3: At least one of the following international courses must be included in the plan of study and can count in one of the marketing 300-400 level elective areas:		
BUSN 340	International Business	
BUSN 341	Global Business Environment	
ENTR 440	International Entrepreneurship (Prereq: ENTR 201 or MGMT 470)	
FIN 440	International Finance	
MGMT 440	International Management	
MRKT 440	International Marketing	
Total Credits		**93**

1

Take the other course not taken for admission to pre-major program.

2

Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and Notes:

- Students follow the published curricula for the marketing program of study from the semester/year of entrance in the College of Business (COB) to graduation provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major are subject to meeting the curricular requirements in effect at the time the new major is declared.
- The CoB accepts a maximum of up to (but not including) 50% of upper-division (300-level and 400-level) business courses[1] required for degree completion, with a minimum grade of C[2]. All transfer courses are subject to approval by the course discipline chair or designated representative.
  a. Defined as courses with the following prefixes: ACCT, BUSN, ENTR, FIN, MGMT, MIS, MRKT, SCM.
  b. Credits that do not qualify for degree completion will still be accepted as general credits toward graduation, within the restrictions defined by university transfer policy.
- Admission to the marketing major is required to enroll in the advanced 300 or 400 level courses in the CoB.

- A grade of 'C' or better is required in transfer courses accepted for all accounting, business administration, finance, management, management information systems, and marketing courses.
- No courses for the major may be taken with Pass/Fail grading.
- Requirements for graduation are those in existence at the time of admission to the marketing major.
- Students must earn a 2.50 institutional GPA to graduate.
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- Students must be accepted to the marketing major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- A Business Administration minor is NOT offered with this major.
- For multiple majors within the CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.
- Internship and cooperative education credits may be applied toward the total credits required for graduation as non-major electives or 300-400 level electives not used in pre-major categories.
- Student may choose to take the Supply Chain Management Track within the Marketing major.

Supply Chain Management Track

Code	Title	Credits
SCM 320	Integrated Supply Chain Management	3
SCM 462	Modeling the Supply Chain	3
Select one of the following:		3
AGEC 378	Introduction to Transportation & Logistics	
MGMT 451	Negotiations	
MRKT 430	Sales and Personal Selling	
MRKT 438	Customer Relationship Management (CRM) and Sales Technology	
MRKT 460	Marketing Strategy	
SCM 460	Production & Operations Management	
Total Credits		**9**

Mathematics

Department Information

- **Department Web Site:**
  www.ndsu.edu/math/ (http://www.ndsu.edu/math/)
- **Credential Offered:**
  B.A.; B.S.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/mathematics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/mathematics/)

Mathematics is the language of science and technology. Its explosive development during the 20th Century and its history as the oldest and most highly developed discipline make math one of the most exciting and rewarding areas of study for the 21st Century.

Background Information

In the past few years, a tremendous increase has occurred in the need for mathematics and mathematicians. In such fields as actuarial science, computer science, statistics, engineering, economics and commerce, mathematical training is in high demand.

If you enjoy mathematics and are good at it, you will find both challenges and opportunities in the Department of Mathematics at North Dakota State University. Your advisor, a faculty member in the department, will provide you with information concerning courses, curricula and the many exciting and rewarding careers open to mathematics graduates. The Cooperative Education Program offers the possibility of academic credit for on-the-job training. The student mathematics organization, Math Club, brings in both academic and nonacademic speakers who explore career possibilities and fascinating topics in mathematics at club meetings. Opportunities for paper grading and tutoring are available and allow students to deepen their understanding by assisting others in learning mathematics.

Our faculty members contribute research findings in a variety of areas in theoretical and applied mathematics to internationally known journals. This wide variety of areas of specialization and expertise of faculty members in the department means that you will probably find someone both interested and knowledgeable in any area of mathematics that might fascinate you.

The Program

The Department of Mathematics offers a broad and balanced curriculum of courses taught by a faculty of 15. A student may choose to major in mathematics or mathematics education. Minors in related areas are encouraged. These choices may be made immediately or deferred until the basic course work is completed. In addition to the Bachelor of Science degree, the department offers master's and doctorate degrees.

Career Opportunities

Our students have been very successful in finding employment. Graduates are working in a wide variety of corporations, agencies, universities and school systems. A number continue on for advanced degrees.

The Curriculum

For a mathematics major, 57 credits of mathematics courses are required. The mathematics education major requires 37 credits and emphasizes those areas of mathematics and related disciplines that have proven most useful for secondary school teachers. In addition, there are cooperative double majors in mathematics and computer science, mathematics and physics, and mathematics and statistics, which take advantage of the overlap of requirements and give the student a broader background, thus opening a wider range of career possibilities. Advisors in the Department of Mathematics can furnish details about these and other programs, such as an emphasis in actuarial mathematics.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
MATH 165[1]	4	MATH 166	4
MATH 129	3	MATH 329	3
ENGL 110	3	ENGL 120	3
COMM 110	3	Gen Ed Social/Behavioral Sciences	3
Gen Ed Humanities/Fine Arts	3	Free Elective	3
	16		**16**
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
MATH 265	4	MATH 266	3
MATH 270	3	MATH 346	3
Related Required Course[2]	3	Related Required Course[2]	3
Gen Ed Humanities/Fine Arts & Cultural Diversity	6	Gen Ed Social/Behavioral Sciences & Global Perspectives	6
	16		**15**
Junior			
Fall	**Credits**	**Spring**	**Credits**
MATH 420	3	MATH 452	3
MATH 450	3	MATH 483	3
Gen Ed Upper Level Writing	3	MATH 300-400 Elective	3
Gen Ed Wellness	2	Gen Ed Science & Tech w/lab	4
MATH 300-400 Elective	3	Related Required Course [2]	3
	14		**16**
Senior			
Fall	**Credits**	**Spring**	**Credits**
MATH 300-400 Electives	4	MATH 491	1
Related Required Course [2]	3	MATH 300-400 Electives	6

Gen Ed Science & Tech	3	Related Required Course[2]	3
Free Electives	4	Gen Ed Science & Tech	3
	14		**13**

Total Credits: 120

1

Students who are not ready for Math 165 may need an additional semester to complete their degree

2

A minor or second major in any other program or 15 credits of coursework that includes at least two 300-level (or higher) courses in another discipline.

Mathematics

Department Information

- **Department Web Site:**
  www.ndsu.edu/math/ (http://www.ndsu.edu/math/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/mathematics/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/mathematics/#planofstudytext)

Major Requirements

Major: Mathematics

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**
Category A: Humanities and Fine Arts †		**6**
Category B: Social and Behavioral Sciences †		**6**
Category W: Wellness †		**2**
Category D: Cultural Diversity *†		

Category G: Global Perspectives [*†]	
Total Credits	**39**

*

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Code	Title	Credits
Required Mathematics Courses		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 346	Metric Space Topology	3
MATH 420	Abstract Algebra I [1]	3
or MATH 620	Abstract Algebra I	
MATH 450	Real Analysis I [1]	3
or MATH 650	Real Analysis I	
MATH 452	Complex Analysis [1]	3
or MATH 652	Complex Analysis	
MATH 483	Partial Differential Equations [1]	3
or MATH 683	Partial Differential Equations	
MATH 491	Seminar	2
Mathematics Electives [1]		
MATH prefix courses numbered 300 or higher, not including those listed above. Students who also major in Math Education may use EDUC 487 (student teaching) towards this requirement. Students approved for the accelerated program should refer to the footnote.		16
Related Required Courses		
A minor or second major in any other program or 15 credits of coursework that includes at least two 300-level (or higher) courses in another discipline.		15
Total Credits		**72**

1

Accelerated Program: Students approved for the accelerated program may complete MATH prefix courses numbered 600-689 toward this math elective section of the major. No more than 15 graduate credits will be applied to the undergraduate math degree.

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.
- A grade of 'C' or better is required in all MATH prefix courses.

Minor Requirements

Minor: Mathematics

Required Credits: 20

Code	Title	Credits
Required Courses		
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 265	Calculus III	3-4
or MATH 266	Introduction to Differential Equations	

Mathematics Concentration: Select one from the following:		**3**
MATH 270	Introduction to Abstract Mathematics	
MATH 329	Intermediate Linear Algebra	
MATH 346	Metric Space Topology	
MATH Prefix Electives		**6**
Electives must be MATH courses numbered 266 or higher (only one of the above may be used here: MATH 266, 270, 329, 346).		
Total Credits		**20-21**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- A grade of 'C' or better is required in all courses used toward this minor.

Mathematics Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.A.; B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/mathematics-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/mathematics-education/)

The Program

Candidates in the mathematics education major are prepared to teach a broad curriculum to a diverse student population in grades 5-12 with creativity and confidence. Mathematics is the language of science and technology, and its history as the oldest and most highly developed discipline making math one of the most exciting and rewarding areas of study for the 21st Century.The mathematics teacher candidate should work closely with an advisor to be sure that the general education courses taken will provide a strong foundation for the advanced courses in the major.

Professional Education Courses

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

Student Teaching

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

Student Advisement

Students will be assigned individual advisors who will work closely with them in program planning. Students are encouraged to meet with their advisor(s) at least once a semester.

Licensure

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

Career Opportunities

Mathematics education is also valued by a wide range of employers in government and industry. Mathematics teachers may also choose to pursue graduate degrees after building classroom experience. Those masters and doctoral degrees could lead to post-secondary academic positions and leadership roles in state and national educational organizations.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as,

but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	3	ENGL 120	3
MATH 165	4	COMM 110	3
Gen Ed Hum/Fine Arts & Cultural Diversity	3	EDUC 321	3
Gen Ed Science & Tech w/Lab	4	MATH 129	3
Gen Ed Wellness	2	MATH 166	4
		Gen Ed Science & Tech	3
		Complete Core Academic Skills Exam or Access your ACT+ Scores	
	16		**19**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 160	4	EDUC 322	3
MATH 265	4	MATH 329	3
MATH 270	3	MATH 440	3
STAT 367	3	STAT 368	3
Gen Ed Social & Behavioral Science	3	Gen Ed Science & Tech (Geoscience, Chemistry, Physics or Biology)	3
		Apply to the School of Education	
	17		**15**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 451	3	EDUC 481	3
EDUC 489	3	MATH 266	3
MATH 420	3	MATH 346	3
Gen Ed Soc/Behav Sci & Global Persp	3	MATH 478	3
Gen Ed Upper Division Writing	3	Gen Ed Hum/Fine Arts	3
	15		**15**
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 475	2	EDUC 485	1
EDUC 486	3	EDUC 487	9
MATH 374	1	EDUC 488	3
MATH 450	3		
Mathematics 300/400 Level Elective	3		
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			

Complete Subject Area Assessment Exam		
	12	**13**

Total Credits: 122

Mathematics Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/mathematics-education/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/mathematics-education/#planofstudytext)

Major Requirements

Major: Mathematics Education

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
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 329	Intermediate Linear Algebra	3
MATH 346	Metric Space Topology	3
MATH 374	Special Problems In Mathematics	1
MATH 420	Abstract Algebra I	3
MATH 440	Axiomatic Geometry	3
MATH 450	Real Analysis I	3
MATH 478	History of Mathematics	3
STAT 367	Probability	3
STAT 368	Statistics	3
Mathematics Courses		
Select one 300-400 level MATH prefix course approved by the department. MATH 266 may be used as one of these electives.		3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Math)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		**78**

Degree Requirements and Notes

- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- A grade of 'C' or better is required in all Teaching Specialty requirement courses and the Professional Education requirement courses.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.
- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- Students pursuing both Mathematics Education and Mathematics majors are encouraged to take STAT 467/468 in place of STAT 367/368, and choose MATH 421 and 453 or 454 as part of their required Math credits.
- See School of Education (https://www.ndsu.edu/education/) for admission requirements.

Mathematics and Physics

Department Information

- **Department Phone:**
  701-231-8171 or 8974
- **Department Web Site:**
  www.ndsu.edu/math/ or www.ndsu.edu/physics/ (http://www.ndsu.edu/math/ or www.ndsu.edu/physics/)
- **Credential Offered:**

B.S.; B.A.

- **Official Program Curriculum:** catalog.ndsu.edu/undergraduate/program-curriculum/mathematics-physics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/mathematics-physics/)

This dual major program is intended for students who desire additional mathematical background and preparation for graduate school or technical careers in the sciences, especially theoretical physics.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110		3	PHYS 251 & 251L	5
PHYS 171		1	MATH 166	4
MATH 165[1]		4	CHEM 151 & CHEM 161 (or CHEM 122 & CHEM 122L)	4
CHEM 150 & CHEM 160 (or CHEM 121 & CHEM 121L)		4	ENGL 120	3
MATH 129		3		
COMM 110		3		
		18		**16**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
PHYS 252 & 252L		5	PHYS 350	3
MATH 265		4	MATH 266	3
MATH 270		3	CSCI 160	4
Gen Ed Humanities/Fine Arts & Global Perspectives		3	MATH 346	3
Gen Ed Wellness		2	Gen Ed Social/Behavioral Science & Cultural Diversity	3
		17		**16**
Junior				
Fall	**Credits**		**Spring**	**Credits**
PHYS 360		3	PHYS 361	3
MATH 420		3	PHYS 370	3
PHYS 355		3	ENGL 324	3
MATH 420, 450, 452, or 483[2]		3	MATH 420, 450, 452, or 483[2]	3
Gen Ed Humanities/Fine Arts		3	MATH 329	3
		15		**15**
Senior				
Fall	**Credits**		**Spring**	**Credits**
PHYS 462		3	PHYS 486	3

PHYS 485	3	PHYS 489	2
Physics Elective	6	Physics Elective	3
MATH 4XX Math Elective	3	MATH 491	2
PHYS 488	1	Gen Ed Social & Behavioral Sciences	3
		Gen Ed Upper Division Writing	3
	16		**16**

Total Credits: 129

[1]

Students who place into a math course lower than MATH 165 may need to extend their time to degree completion by up to a year.

[2]

Math Elective: Student must select two classes from the grouping

Mathematics and Physics

Department Information

- **Department Web Site:**
  www.ndsu.edu/math/ (http://www.ndsu.edu/math/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/mathematics-physics/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/mathematics-physics/#planofstudytext)

Major Requirements

Major: Mathematics & Physics

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**
Category A: Humanities and Fine Arts †		**6**

Category B: Social and Behavioral Sciences †	**6**
Category W: Wellness †	**2**
Category D: Cultural Diversity *†	
Category G: Global Perspectives *†	
Total Credits	**39**

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

A grade of 'C' or better is required for all MATH, PHYS, and AST prefix courses.

Code	Title	Credits
Mathematics Major Requirements		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 346	Metric Space Topology	3
Select any two of the following:		6
MATH 420	Abstract Algebra I	
MATH 450	Real Analysis I	
MATH 452	Complex Analysis	
MATH 483	Partial Differential Equations	
MATH 491	Seminar	2
Physics Major Requirements		
PHYS 171	Introductory Projects in Physics	1
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
PHYS 350	Modern Physics	3
PHYS 355	(or PHY 330: Intermediate Mechanics at MSUM)	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHY 370: Electromagnetic Theory at MSUM)	3
PHYS 370	Introduction to Computational Physics	3
PHYS 462	Thermal and Statistical Physics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
PHYS 488	Senior Project I	1
PHYS 489	Senior Project II	2
Physics Electives: Select 3 of the following:		9
PHYS 215	Research For Undergraduates	
PHYS 411	Optics for Scientists & Engineers	
PHYS 413	Lasers for Scientists and Engineers	
PHYS 415	Elements of Photonics	
PHYS 481	Materials Physics	
MSUM AST	Astronomy courses (300/400-level) with departmental pemission	

Related Required Courses		
Computer Science:		
CSCI 160	Computer Science I	4
Chemistry: Select one of the following (150/160 recommended):		4
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
Select one of the following (151/161 recommended):		4
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Total Credits		**94**

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Mathematics and Statistics

Department Information

- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/mathematics-statistics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/mathematics-statistics/)

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 (https://www.ndsu.edu/math/) and Department of Statistics (https://www.ndsu.edu/statistics/) early and often to confirm their progress and to inform themselves of changes in the examination curriculum.

Sample Program Guide

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Math and Statistics

Freshman			
Fall	**Credits**	**Spring**	**Credits**
MATH 165[1]	4	MATH 166	4
MATH 129	3	MATH 329	3
CSCI 160	4	STAT 330	3
ENGL 110 or 120 (based on placement)	3	CSCI 161	4

			Gen Ed Science & Tech		3
		14			**17**
Sophomore					
Fall	**Credits**		**Spring**	**Credits**	
MATH 265		4	MATH 266		3
MATH 270		3	MATH 346		3
STAT 367		3	STAT 368		3
STAT 461		3	COMM 110		3
Gen Ed Social/Behavioral Science & Global Perspectives		3	Gen Ed Humanities/Fine Arts & Cultural Diversity		3
		16			**15**
Junior					
Fall	**Credits**		**Spring**	**Credits**	
MATH 450		3	STAT 468		3
STAT 467		3	MATH 300-400 Elective		3
Gen Ed Humanities/Fine Arts		3	STAT 400 Electives		6
Gen Ed Social/Behavioral Science		3	Gen Ed Upper Level Writing		3
Elective		3			
		15			**15**
Senior					
Fall	**Credits**		**Spring**	**Credits**	
MATH 491		1	STAT 462 (Capstone)		3
STAT 400 Electives		3	STAT 400 Electives		3
Gen Ed Science & Tech w/lab		4	Electives		9
Gen Ed Science & Tech		3			
Gen Ed Wellness		2			
		13			**15**

Total Credits: 120

1

Students who are not ready for Math 165 may need an additional semester to complete their degree.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Math and Statistics (Pre-Actuarial)

Freshman					
Fall	**Credits**		**Spring**	**Credits**	
MATH 165[1]		4	MATH 166		4
MATH 129		3	MATH 329		3
STAT 330		3	COMM 110		3
ENGL 110 or 120 (based on placement)		3	ECON 202		3

ECON 201		3	Gen Ed Humanities & Fine Arts		3
		16			**16**
Sophomore					
Fall	**Credits**		**Spring**	**Credits**	
MATH 265		4	CSCI 161		4
MATH 270		3	MATH 266		3
CSCI 160		4	MATH 346		3
STAT 367		3	STAT 368		3
			STAT 461		3
		14			**16**
Junior					
Fall	**Credits**		**Spring**	**Credits**	
MATH 450		3	STAT 468		3
STAT 467		3	ACCT 201		3
ACCT 200		3	MATH 300-400 Elective		3
STAT 400 Elective		3	STAT 400 Elective		3
Gen Ed Upper Level Writing		3	Actuarial Elective (Select from official curriculum guide)		3
		15			**15**
Senior					
Fall	**Credits**		**Spring**	**Credits**	
STAT 400 Elective		3	STAT 476		1
Gen Ed Science & Tech		3	STAT 462 (Capstone)		3
Gen Ed Science & Tech w/ Lab		4	Gen Ed Science & Tech		3
Actuarial Elective (Select from the official curriculum guide)		3	Gen Ed Hum & Fine Arts/ Cult Div		6
			Gen Ed Wellness		2
		13			**15**

Total Credits: 120

[1]

Students who are not ready for Math 165 may need an additional semester to complete their degree.

Mathematics and Statistics

Department Information

- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/mathematics-statistics/ (http://catalog.ndsu.edu/programs-study/undergraduate/mathematics-statistics/)

Major Requirements

Major: Mathematics & Statistics

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Mathematics & Statistics Major Requirements

A grade of 'C' or better is required in all MATH and STAT prefix courses.

Code	Title	Credits
Math Major Requirements		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 346	Metric Space Topology	3
MATH 450	Real Analysis I	3
MATH 491	Seminar (Seminar)	2
Mathematics Electives	Any 300-400 level MATH prefix courses not listed above	3
Statistics Major Requirements		
STAT 330	Introductory Statistics	3

STAT 367	Probability	3
STAT 368	Statistics	3
STAT 461	Applied Regression Models	3
STAT 462	Introduction to Experimental Design (Capstone)	3
STAT 467	Probability and Mathematical Statistics I	3
STAT 468	Probability and Mathematical Statistics II	3
Statistics Electives	400 level STAT prefix courses not listed above	12
Related Required Courses:		
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
Total Credits		**76**

Major Requirements

Major: Mathematics & Statistics Pre-Actuarial Option

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

A grade of 'C' or better is required for all courses used toward the major.

Code	Title	Credits
Math Major Requirements		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 346	Metric Space Topology	3
MATH 450	Real Analysis I	3
Mathematics Elective	Any 300-400 level MATH prefix courses not listed above	3
Statistics Major Requirements		
STAT 330	Introductory Statistics	3
STAT 367	Probability	3
STAT 368	Statistics	3
STAT 461	Applied Regression Models	3
STAT 462	Introduction to Experimental Design (Capstone)	3
STAT 467	Probability and Mathematical Statistics I	3
STAT 468	Probability and Mathematical Statistics II	3
STAT 476	Actuary Exam Study	1
Statistics Elective	Any 400 level STAT prefix courses not listed above	6
Related Required Courses		
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B and G)	3
Electives: Select two courses from the following:		6
CSCI 453	Linear Programming and Network Flows	
ECON 341	Intermediate Microeconomics	
ECON 343	Intermediate Macroeconomics	
ECON 356	History of Economic Thought	
ECON 410	Econometrics	
ECON 440	Game Theory and Strategy	
ECON 461	Economic Development	
ECON 465	Labor Economics	
ECON 470	Public Economics	
ECON 472	International Trade	
ECON 476	Monetary Theory and Policy	
ECON 480	Industrial Organization	
ECON 481	Natural Resource Economics	
ECON 482	Environmental Economics	
FIN 320	Principles of Finance	
FIN 410	Investment Analysis and Management	
FIN 420	Options, Futures, and Other Derivatives	
FIN 450	Advanced Bank Management	

FIN 460	Corporate Finance	
Total Credits		**87**

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Mechanical Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/me/ (http://www.ndsu.edu/me/)
- **Credential Offered:**
  B.S.M.E.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/mechanical-engineering/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/mechanical-engineering/)

The mechanical engineer deals with the broad areas of heat, energy, force and motion, and their effects on a multitude of products. Mechanical engineers may be involved in the design of large industrial machinery, power plants, automobiles and aircraft, robots, biomedical devices and equipment, precision measurement and data acquisition equipment, nanotechnology and new materials, among others. Within these areas, the mechanical engineer enjoys considerable professional flexibility.

The Program

The demand for mechanical engineers with a good technical education has been high for many years. The Department of Mechanical Engineering at North Dakota State University offers an education that enables its graduates to take their places in all facets of the profession. Since inception, the department has graduated thousands of mechanical engineers who have worked throughout the United States and many other parts of the world. The Bachelor of Science in Mechanical Engineering program is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the commission's General Criteria and Program Criteria for Mechanical and Similarly Named Engineering Programs.

Curriculum

The standard curriculum allows students flexibility in choosing courses that reflect their interests within the broad areas of mechanical engineering. These include mechanics, materials and nanotechnology, biomedical engineering, alternative energy, fluid dynamics, robotics and more. ME students also have the opportunity to pursue minors in coatings and polymeric materials, biomedical engineering, and robotics, among others, which can enhance their educational experience.

Undergraduate students who excel in our program may consider advancing towards a master's degree by applying for our Accelerated Master's Program. This option gives the student a jump-start on the Master of Science curriculum requirements while they finish their Bachelor of Science degree by allowing 6 credits of coursework to be applied to both degrees.

The Faculty and Facilities

The Department of Mechanical Engineering is housed in Dolve Hall, which is part of an eight-building engineering complex. Laboratories and classrooms are well-suited and equipped for teaching and research. Students have access to PC computer clusters and facilities located in Dolve Hall to assist them in their laboratory and class work. The faculty offers a variety of expertise and extensive experience in teaching and research.

High School Preparation

To enroll in the mechanical engineering curriculum for the freshman year, students should have two years of high school algebra and one year of trigonometry, as well as a year in chemistry and physics. Students without these courses may take them at NDSU to better prepare academically for a specific engineering curriculum.

Selective Admission

The Department of Mechanical Engineering has minimum admission requirements for new freshmen and transfer students.

New freshmen must have a minimum high school grade point average (GPA) of 3.0 or have a minimum math ACT of 26 or SAT math sub score of 590.

Transfer students must have a minimum cumulative grade point average (GPA) of 2.7.

All new students who meet mechanical engineering admission requirements are initially admitted to the basic program in mechanical engineering. After completing the first two years of the curriculum with a minimum GPA of 2.5, minimum engineering GPA of 2.7 and no grade below a C, students are eligible for admission to the professional program. The engineering GPA is calculated based on specific core engineering courses.

Students who do not meet the minimum admission criteria will be placed in mechanical engineering under the advisement of a general engineering advisor until minimum admission criteria have been met.

Career Opportunities

Recent graduates have found employment in companies throughout the United States. The average starting salary is approximately $68,000. A sampling of companies hiring NDSU graduates includes: 3M, American Crystal Sugar, Angus Palm, Applied Engineering, Arctic Cat Inc., Black and Veatch, Bobcat, Boeing, Cargill, Caterpillar, CNH Industrial, Daktronics, Horsch Anderson, Integrity Windows, John Deere, Montana Dakota Utilities, Parker-Hannifin, Polaris, Puget Sound Naval Shipyard and Xcel Energy.

Cooperative Education Program

Students in mechanical engineering are encouraged to participate in the Cooperative Education Program at NDSU. It consists of one or more four-month sessions of work experience after completion of the sophomore year. This optional industry experience provides students with hands-on opportunities not available in the classroom and makes students more marketable to employers after graduation. Students who complete an internship or co-op may be eligible to apply those credits towards graduation as technical elective coursework.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
MATH 165	4	MATH 166	4
ENGL 110	3	ENGL 120	3
CHEM 121	3	CHEM 122	3
ME 111	2	ME 212	3
Gen Ed Humanities & Fine Arts	3	ME 221	3
		Gen Ed Wellness	2
	15		**18**
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
MATH 129	3	MATH 266	3
MATH 259	3	COMM 110	3
IME 330	3	PHYS 252 & 252L	5
ME 222	3	ME 213	3
ME 223	3	ME 351	3
Gen Ed Social & Behavioral Science/ Global Perspectives	3		
	18		**17**
Junior			
Fall	**Credits**	**Spring**	**Credits**
ECE 301	3	ECE 306	1
ENGL 321	3	ME 361	3
ME 331	4	ME 442	3
ME 352	3	ME 454	3
Technical Elective	3	ENGR 327	3
		Technical Elective	3
	16		**16**

Senior				
Fall	**Credits**		**Spring**	**Credits**
ME 421		3	ME 412	3
ME 443		3	ME 462	3
ME 457		3	Technical Elective	3
ME 461		3	Technical Elective	3
Technical Elective		3	Gen Ed Social & Behavioral Science	3
		15		**15**

Total Credits: 130

Degree Notes:

- Students who transfer any 30 or more credits into the program are not required to take ME 111.
- No grades less than 'C' will be accepted to fulfill a degree requirement.
- No more than nine credits of approved technical electives may be taken outside the ME department.
- Admission to the Mechanical Engineering Professional program requires a minimum 2.70 engineering GPA and a minimum 2.50 cumulative GPA.
- A 2.50 cumulative GPA is required for graduation requirements.

Mechanical Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/me/ (http://www.ndsu.edu/me/)
- **Credential Offered:**
  B.S.M.E.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/mechanical-engineering/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/mechanical-engineering/#planofstudytext)

Major Requirements

Major: Mechanical Engineering

Degree Type: B.S.M.E.
Minimum Degree Credits to Graduate: 130

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	

COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**
Category A: Humanities and Fine Arts †		**6**
Category B: Social and Behavioral Sciences †		**6**
Category W: Wellness †		**2**
Category D: Cultural Diversity *†		
Category G: Global Perspectives *†		
Total Credits		**39**

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Mechanical Engineering Requirements:		
ME 111	Introduction to Mechanical Engineering *	2
ME 212	Fundamentals of Visual Communication for Engineers	3
ME 213	Modeling of Engineering Systems	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
ME 331	Materials Science and Engineering	4
ME 351	Thermodynamics I	3
ME 352	Fluid Dynamics	3
ME 361	Product Design and Development	3
ME 412	Engineering Measurements	3
ME 421	Theory of Vibrations	3
ME 442	Machine Design I	3
ME 443	Machine Design II	3
ME 454	Heat and Mass Transfer	3
ME 457	Thermal Systems Laboratory	3
ME 461	Design Project I	3
ME 462	Design Project II	3
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
CHEM 121	General Chemistry I (May satisfy general education category S)	3
CHEM 122	General Chemistry II (May satisfy general education category S)	3
ECE 301	Electrical Engineering I	3
ECE 306	Electrical Engineering Lab I	1
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
ENGR 327	Ethics, Engineering, and Technology	3
IME 330	Manufacturing Processes	3
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
Technical Electives: Select 15 credits from the following:		15

ME 332	Engineering Materials II
ME 353	Thermodynamics II
ME 435	Plastics and Polymer Processing in Manufacturing
or IME 635	Plastics and Injection Molding Manufacturing
ME 436	Biopolymers and Biocomposites
ME 437	Engineering Ceramics
ME 468	Introduction to Biomechanics
ME 469	Energy Storage Technology
ME 470	Renewable Energy Technology
ME 471	Experimental Stress Analysis
ME 472	Fatigue and Fracture of Metals
ME 473	Engineering with Polymeric Materials
ME 474	Mechanics of Composite Materials
ME 475	Automatic Controls
ME 476	Mechatronics
ME 477	ME Finite Element Analysis
ME 478	Advanced Flow Diagnostics
ME 479	Fluid Power Systems Design
or ABEN 479	Fluid Power Systems Design
ME 480	Biofluid Mechanics
ME 481	Fundamentals of Energy Conversion
ME 482	Fuel Cell Science and Engineering
ME 483	Introduction to Computational Fluid Dynamics
ME 484	Gas Turbines
ME 485	Heating, Ventilation and Air Conditioning
ME 486	Nanotechnology and Nanomaterials
or CE 686	Nanotechnology and Nanomaterials
ME 487	Internal Combustion Engines
ME 488	Introduction to Aerodynamics
ME 489	Vehicle Dynamics
Approved technical electives from other departments - no more than 3 courses from the following:	
ABEN 456	Biobased Energy
CPM 473	Polymer Synthesis
CPM 474	Applied Polymer Science
CPM 475	Coatings' Materials Science
CPM 486	Corrosion and Materials
CSCI 485	Autonomous Command and Artificial Intelligence for Robots and Other Cyber-Physical Systems
ECE 463	Modern Control
ECE 461	Control Systems I
ECE 485	Biomedical Engineering
ECE 487	Cardiovascular Engineering
ECE 488	Cardiovascular Engineering II
ENGR 310	Entrepreneurship for Engineers and Scientists
ENGR 321	Introduction to Robotics
ENGR 379	Global Seminar
IME 380	CAD/CAM for Manufacturing
IME 430	Process Engineering
IME 431	Production Engineering
IME 432	Composite Materials Manufacturing
IME 433	Additive Manufacturing
IME 440	Engineering Economy
IME 450	Systems Engineering and Management

IME 460	Evaluation of Engineering Data
IME 465	Introduction to Machine Learning
IME 485	Industrial and Manufacturing Facility Design
PHYS 350	Modern Physics
PHYS 355	
PHYS 361	Electromagnetic Theory
PHYS 485	Quantum Mechanics I
Total Credits	**110**

*
Students who transfer any 30 or more credits into the program are not required to take ME 111.

*
Students who have completed ABEN 110 or ENGR 111 are not required to take ME 111.

Degree Requirements and Notes

- No grades less than 'C' will be accepted to fulfill a degree requirement.
- No more than nine credits of approved technical electives may be taken outside the ME department.
- Admission to the Mechanical Engineering Professional program requires a minimum 2.70 engineering GPA and a minimum 2.50 cumulative GPA.
- A 2.50 cumulative GPA is required for graduation requirements.

Mechanical Engineering and Physics

Department Information

- **Department Web Site:**
  www.ndsu.edu/me/ (http://www.ndsu.edu/me/)
- **Credential Offered:**
  B.S.M.E.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/mechanical-engineering-physics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/mechanical-engineering-physics/)

Engineering and physics are closely related disciplines. Mechanical engineering combines engineering physics and applied mathematics with materials science to design mechanical systems and novel materials. It requires knowledge of core areas of physics, such as mechanics, thermodynamics, theory of elasticity, electricity and magnetism. Modern materials science requires understanding of quantum physics. Therefore, the demand is growing for engineers with multidisciplinary training that includes both fundamental knowledge of physics and practical problem-solving skills.

The Mechanical Engineering and Physics double major program is designed to allow students to complete the core requirements of both majors in a four-year degree. Graduates of the program will have a unique background qualifying them to work in industry or to pursue graduate studies in engineering, physics or related fields of science and technology. One degree is awarded for this major but both mechanical engineering and physics majors are listed under the Bachelor of Mechanical Engineering Degree (B.S.M.E) on the transcript.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
MATH 165	4	MATH 166	4
ENGL 110 (or placement)	3	ENGL 120	3
CHEM 121	3	CHEM 122	3
ME 111	2	ME 212	3
PHYS 171	1	ME 221	3

Gen Ed Humanities & Fine Arts		3	Gen Ed Wellness		2
		16			**18**
Sophomore					
Fall	**Credits**		**Spring**	**Credits**	
MATH 129		3	MATH 266		3
MATH 265		4	COMM 110		3
IME 330		3	PHYS 252		4
ME 222		3	PHYS 252L		1
ME 223		3	ME 213		3
			ME 351		3
		16			**17**
Junior					
Fall	**Credits**		**Spring**	**Credits**	
ENGL 321		3	ECE 301		3
ME 331		4	ME 361		3
ME 352		3	ME 442		3
PHYS 355 (ME Tech Elective)		3	ME 454		3
PHYS 411		3	PHYS 350 (ME Tech Elective)		3
PHYS 411L		1	PHYS 361 (ME Tech Elective)		3
		17			**18**
Senior					
Fall	**Credits**		**Spring**	**Credits**	
ECE 306		1	ME 412		3
ME 443		3	ME 462		3
ME 457		3	ME 421		3
ME 461		3	Physics Elective		3
PHYS 485		3	Gen Ed Social & Behavioral Science		3
Gen Ed Social/Behavioral Sci & Global Perspect		3	ENGR 327		3
		16			**18**

Total Credits: 136

Degree Notes:

- Students who transfer any 30 or more credits into the program are not required to take ME 111.
- No grade less than 'C' is accepted to fulfill any of the degree requirements.
- Admission to the Mechanical Engineering Professional program requires a minimum 2.70 engineering GPA and a minimum 2.50 cumulative GPA.
- A 2.50 cumulative GPA is required for graduation.

Mechanical Engineering and Physics

Department Information

- **Department Web Site:**
  www.ndsu.edu/me/ (http://www.ndsu.edu/me/)
- **Credential Offered:**
  B.S.M.E
- **Sample Program Guide:**

catalog.ndsu.edu/programs-study/undergraduate/mechanical-engineering-physics/ (http://catalog.ndsu.edu/programs-study/undergraduate/mechanical-engineering-physics/)

Major Requirements

Major: Mechanical Engineering & Physics

Degree Type: B.S.M.E.
Minimum Degree Credits to Graduate: 136

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Mechanical Engineering & Physics Major Requirements

Code	Title	Credits
CHEM 121	General Chemistry I	3
CHEM 122	General Chemistry II	3
ECE 301	Electrical Engineering I	3
ECE 306	Electrical Engineering Lab I	1
ENGL 321	Writing in the Technical Professions	3
ENGR 327	Ethics, Engineering, and Technology (Humanities and Fine Arts Gen Ed)	3

IME 330	Manufacturing Processes	3
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
ME 111	Introduction to Mechanical Engineering [2,3]	2
ME 212	Fundamentals of Visual Communication for Engineers	3
ME 213	Modeling of Engineering Systems	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
ME 331	Materials Science and Engineering	4
ME 352	Fluid Dynamics	3
ME 351	Thermodynamics I	3
ME 361	Product Design and Development	3
ME 412	Engineering Measurements	3
ME 421	Theory of Vibrations	3
ME 442	Machine Design I	3
ME 443	Machine Design II	3
ME 454	Heat and Mass Transfer	3
ME 457	Thermal Systems Laboratory	3
ME 461	Design Project I	3
ME 462	Design Project II	3
PHYS 171	Introductory Projects in Physics	1
PHYS 252	University Physics II	4
PHYS 252L	University Physics II Laboratory	1
PHYS 350	Modern Physics [1]	3
PHYS 355	[1]	3
PHYS 361	Electromagnetic Theory [1]	3
PHYS 411	Optics for Scientists & Engineers	3
PHYS 411L	Optics for Scientists and Engineers Lab	1
PHYS 485	Quantum Mechanics I	3
PHYS Elective		3
Total Credits		**116**

1

Mechanical engineering technical electives

2

Students who transfer any 30 or more credits into the program are not required to take ME 111.

3

Students who have completed ABEN 110 or ENGR 111 are not required to take ME 111.

Degree Notes:

- No grade less than 'C' is accepted to fulfill any of the degree requirements.
- Admission to the dual major requires a minimum 2.70 GPA
- A 2.50 cumulative GPA is required for graduation.

Medical Laboratory Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/alliedsciences/ (http://www.ndsu.edu/alliedsciences/)

- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/medical-laboratory-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/medical-laboratory-science/)

Medical laboratory scientists use analytical procedures and complex instruments to perform tests on blood and body fluids that assist physicians in patient diagnosis and treatment, disease monitoring and prevention. Because the tests performed are so vital in medical treatment, the medical laboratory scientist must know how to perform these tests with scientific precision and accuracy, but also be well educated in the underlying scientific principles and clinical significance of the results.

Background Information

Laboratory work plays a vital role in the daily routine of the medical laboratory scientist and, while usually not having direct contact with patients, the MLS enjoys being a vital member of the health care team. Clinical chemistry, hematology, microbiology, urinalysis, immunohematology and immunology are the principal areas of practice in the medical laboratory. In addition to laboratory testing and analysis, a medical laboratory scientist may also monitor test quality, supervise personnel, conduct research and develop new tests and methodologies.

Career Opportunities

Certified medical laboratory scientists may readily find employment throughout the country in hospitals, medical and diagnostic laboratories, and other healthcare services. According to the U.S. Department of Labor Bureau of Labor Statistics (https://www.bls.gov/ooh/healthcare/medical-and-clinical-laboratory-technologists-and-technicians.htm), employment of clinical laboratory workers is expected to grow faster than average for all occupations through 2026. This increase is attributed to growth in the aging population leading to a greater need to diagnose medical conditions through laboratory procedures, as well as prenatal testing for various genetic conditions which has become increasingly common. Mean annual wages for medical laboratory scientists/technologists was $57,380 in 2022 (Clinical Laboratory Technologists and Technicians : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics (bls.gov) (https://www.bls.gov/ooh/healthcare/clinical-laboratory-technologists-and-technicians.htm))

The Program

North Dakota State University's Bachelor of Science degree, with a major in medical laboratory science, includes three years of academic courses on campus followed by an 11-to-12-month full-time professional-level internship in an affiliated hospital-based school of medical laboratory science. Graduates are eligible to take a national certification exam administered by the American Society for Clinical Pathology Board of Certification (https://www.ascp.org/content/Board-of-Certification/). NDSU graduates have enjoyed excellent employment opportunities and pass rates on the ASCP BOC exam. To remain certified, medical laboratory scientists must earn continuing education credits.

Students interested in pursuing medical laboratory science should have an interest and aptitude in the sciences, particularly chemistry and biology. College courses include college algebra, biological sciences, microbiology, general chemistry, organic chemistry, biochemistry and statistics, along with general education courses. Transfer students need to successfully complete a minimum of 20 resident credits at NDSU prior to beginning an internship. The full-time internship consists of classroom and clinical bench instruction in clinical chemistry, hematology, immunohematology, microscopy/urinalysis, microbiology, serology, phlebotomy, education, management, and research methods.

Internship Admission

Internship application occurs annually in the fall. Pre-MLS students who will have completed all courses on campus by start of the internship and meet grade and grade point average (GPA) requirements may be eligible to apply for the professional-level internship. This internship occurs onsite within an affiliated hospital-based MLS program. NDSU maintains affiliation with four medical laboratory science programs. These include: Sanford Medical Center (Fargo, ND), Mercy College of Health Sciences (Des Moines, IA), Methodist Hospital (Omaha, NE), and Colorado Center for Medical Laboratory Science (Aurora, CO). All affiliated programs are accredited by the National Accrediting Agency for Clinical Laboratory Science. (https://naacls.org/Students.aspx)

Internship admission is selective. Admission criteria are established by each hospital program and generally includes the student's cumulative and science GPA (a minimum of 2.50-3.00 is required and varies by hospital program), courses completed, related experience, references and an interview. In addition, students must comply with criminal background and student conduct requirements. In order to participate in an MLS internship, students must be able to comply with program-designated essential functions or request reasonable accommodations to meet these essential functions. Requirements include sound intellect, good motor skills, eye-hand coordination and dexterity, effective communication skills, visual acuity to perform macroscopic and microscopic analyses, or read procedures and graphs, and behavioral skills such as organization, time management and good judgment, even in emergency situations.

It is highly recommended that students interested in the MLS major meet with a medical laboratory science advisor to discuss degree and major requirements, internship admission, and create an individualized plan of study at least one year prior to their anticipated internship application. Information about the profession, curriculum, internship, and advising contacts are available from the NDSU Department of Allied Sciences (https://www.ndsu.edu/alliedsciences/).

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year							
Fall	**Credits**		**Spring**	**Credits**			
BIOL 150 & 150L		4	CHEM 122 & 122L		4		
CHEM 121 & 121L		4	BIOL 151		3		
MATH 103		3	CSCI 114		3		
ENGL 110		3	ENGL 120		3		
			STAT 330		3		
		14			**16**		
Second Year							
Fall	**Credits**		**Spring**	**Credits**			
BIOL 220 & 220L		4	BIOL 221 & 221L		4		
CHEM 341 & 341L[1]		4	CHEM 342[1]		3		
MLS 200		1	MICR 460 & 460L		5		
MICR 350 & 350L		5	COMM 110		3		
Wellness (W)		2					
		16			**15**		
Third Year							
Fall	**Credits**		**Spring**	**Credits**			
BIOC 460 & 460L		4	Humanities & Fine Arts (A)		3		
BIOL 315 & 315L		4	MLS 435		2		
MICR 470 & MICR 471		5	MICR 463		2		
Social & Behavioral Sciences (B)		3	Social & Behavioral Sciences (B) & Cultural Diversity (D)		3		
			Upper Division Writing (C; 300-400 level)		3		
			Humanities & Fine Arts (A) & Global Perspective (G)		3		
		16			**16**		
Fourth Year							
Fall	**Credits**		**Spring**	**Credits**		**Summer**	**Credits**
MLS 496[2]		12	MLS 496[2]		12	MLS 496[2]	6
		12			**12**		**6**

Total Credits: 123

1

Students have the option to complete Chem 240, Bioc 460, Bioc 460L, & Bioc 461 in place of Chem 341, Chem 341L, Chem 342, Bioc 460 & Bioc 460L.

2

Credits earned in an affiliated, NAACLS accredited hospital program; one year in length, including one summer session.

Medical Laboratory Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/alliedsciences/ (http://www.ndsu.edu/alliedsciences/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/medical-laboratory-science/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/medical-laboratory-science/#planofstudytext)

Major Requirements

Medical Laboratory Science

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Medical Laboratory Science Major Requirements		
CHP 190		3
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	4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151	General Biology II	3
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy a general education category S)	4
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy a general education category S)	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
CSCI 114	Computer Applications (May satisfy a general education category S)	3
or TL 116	Business Software Applications	
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	Microbial Pathogenesis and Microbial Pathogenesis Laboratory	5
MICR 470	Basic Immunology	3
MICR 471	Immunology and Serology Laboratory	2
STAT 330	Introductory Statistics (May satisfy a general education category R)	3
Select one group of the following:		**6-7**
Group One:		
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	
CHEM 342	Organic Chemistry II	
Group Two:		
CHEM 240	Survey of Organic Chemistry	
BIOC 461	Foundations of Biochemistry and Molecular Biology II	
Total Credits		**99-100**

Degree Requirements and Notes

- All required courses must be completed with a grade of 'C' or above. All students must maintain a semester GPA of 2.0 or above for each semester in the College. A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the College.

- Completion of the prerequisites does not guarantee a student internship. Selection of interns is competitive. Please consult your MLS advisor for more information.

Microbiology

Department Information

- **Department Web Site:**
  www.ndsu.edu/microbiology/ (http://www.ndsu.edu/microbiology/)
- **Credential Offered:**
  B.S.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/microbiology/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/microbiology/)

Microbiology is a fundamental biological science concerned with bacteria, viruses, and other microbes. Microbiologists have made some of the most important scientific discoveries. Since 1910, approximately one-third of the Nobel Prizes in medicine and physiology have been awarded to microbiologists. The discipline covers a wide spectrum of specialized interest areas that show how microbes affect human and animal health, agriculture, our environment, food technology and safety, and the biotechnology industry. Microbiology prepares students for a wide range of important career opportunities.

In recent years, microbiology has had a major impact on virtually all other scientific disciplines. For this reason, students who choose to major in microbiology often minor in biotechnology, chemistry, or food safety. Students who choose to major in other fields may find it advantageous to minor in microbiology.

CAREER OPPORTUNITIES

Graduates may seek employment in the health sciences, biomedical industries, biotechnology, agricultural biosystems, food industries, pharmaceutical industries, and government agencies. Our graduates work in public health, hospital laboratories, quality control laboratories to ensure a safe food supply, academic, government, or private research laboratories, biotechnology production laboratories, and even breweries. Many microbiologists are teachers and professors, and many of our graduates attend graduate or professional school to continue their career development. Microbiologists work in government agencies such as state public health units, the National Institutes of Health (NIH), the Centers for Disease Control (CDC), the United States Department of Agriculture (USDA), and the Environmental Protection Agency (EPA).

Scholarship Opportunities

Students who major in microbiology can apply for part of ~$12,000 in scholarships that are dedicated funds for our major and ~$7500 in scholarships for Microbiology Majors planning to apply for veterinary school. Visit the website (https://www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences/microbiology-scholarships/) for microbiology specific scholarships.

High School Preparation

Courses in science and mathematics, such as algebra, biology, physics, and chemistry, will help students prepare for a major in microbiology.

Transfer student PREPARATION

Transfer students are strongly advised to take transferable intro biology and chemistry courses in preparation for upper-level science courses at NDSU.

The Curriculum

During the first year, students in microbiology take basic college courses in English, chemistry, biology, and mathematics. The curriculum over the next three years includes advanced microbiology and life sciences courses. These courses include microbial physiology, microbial genetics, virology, immunology, and microbial ecology. Students majoring in microbiology can enhance their understanding of applied microbiology and infectious disease by taking courses such as pathogenic microbiology, clinical parasitology, food microbiology, and microbial genomics. Students may choose to minor in programs such as biotechnology, public health, and food safety.

Program Outcomes

1. Demonstrate a familiarity with professional and ethical behavior in microbiology.
2. Identify and explain microbiology discipline-specific knowledge and concepts.
3. Describe the process of scholarly inquiry in microbiology
4. Perform classical and modern microbiological techniques with consistency.
5. Communicate scientific results and scientific understanding to a chosen audience.

6. Participates effectively as a team member in collaborative work.
7. Exhibit professional skills and personal effectiveness to enter the job market.
8. Describe their role and begin participating in being civically responsible, contributing citizens, and creating inclusive environments.

Pathways to Success

The department of Microbiological Sciences offers several “Pathways to Success.” Depending on your career goals, you may find that one of these pathways will enhance your education to meet those goals. We currently have Pathways to Success inGeneral Microbiology, Pre-Health Careers, Pre-Veterinary careers, Biotechnology (Double Major), and Accelerated Master’s (Public Health or Microbiology).

STUDENT ORGANIZATIONS

We have an active Biotechnology and Microbiology Club that tours local businesses related to biotechnology and microbiology, hosts guest speakers currently working in the fields of microbiology and biotechnology, and meets for social events throughout the year.

The Faculty

The teaching faculty offers expertise and experience in a variety of microbiology areas. Additionally, faculty members are active researchers and devoted research mentors. Our undergraduates have opportunities to perform cutting-edge research in nationally funded laboratories.

The FACILITIES

The Department of Microbiological Sciences in Van Es Hall has well-equipped teaching and research laboratories, including our Biotechnology Innovation Core. Several courses are taught in the dedicated STEM education building, A. Glenn Hill Center.

Post Graduate Opportunities

Professional School Preparation. The microbiology major is excellent preparation for professional school, including medical, veterinary, dental, optometry, and physician assistant programs.

Graduate School. The microbiology major emphasizes experiential learning in coursework and research laboratories that provide the foundation to be successful in graduate school. We even offer an accelerated master's program to help students optimize their timeline to completing their graduate degree while finishing their bachelor's degree.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
MICR 189*	1	BIOL 151	3
CHEM 121	3	BIOL 151L	1
CHEM 121L	1	CHEM 122	3
BIOL 150	3	CHEM 122L	1
BIOL 150L	1	ENGL 120	3
ENGL 110	3	Gen Ed Social and Behavioral/ Global Perspectives	3
MATH 105 or 146[2]	3	Gen Ed Wellness	2
	15		**16**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	MICR 352	3
CHEM 341	3	MICR 352L	2
CHEM 341L	1	PLSC 315	3
STAT 330	3	PLSC 315L	1

MICR 350	3	CHEM 342	3
MICR 350L	2	MICR 452	3
	15		**15**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
BIOC 460	3	BIOC 461	3
PHYS 211	3	PHYS 212	3
PHYS 211L	1	PHYS 212L	1
MICR 470	3	MICR 480	3
PHIL Course Requirements[1]	3	Microbiology Elective	3
Gen Ed Humanities and Fine Arts/ Cultural Diversity	3	MICR 485	1
	16		**14**
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
Upper Division Writing Gen Ed	3	Microbiology Elective Laboratory[3]	2
MICR 482	3	Microbiology Elective	3
MICR 475	3	MICR 486	1
Microbiology Capstone Elective[4]	2	Microbiology Elective	3
Gen Ed Social & Behavioral Sciences	3	Free Elective	6
	14		**15**

Total Credits: 120

*****

Only required for first-time, first-year students.

1

Select from PHIL 111, PHIL 210, PHIL 215, PHIL 216, PHIL 225 or PHIL 327

2

Or higher level math

3

BIOC 474 or MICR 445 or MICR 460L or MICR 471

4

MICR 493 or MICR 494 or MICR 496 or MICR 497 (must be a minimum of 2 credits)

Microbiology

Department Information

- **Department Web Site:**
  www.ndsu.edu/microbiology/ (http://www.ndsu.edu/microbiology/)
- **Credential Offered:**
  B.S.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/microbiology/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/microbiology/#planofstudytext)

Major Requirements

Major: Microbiology

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Microbiology Core Courses		
MICR 189	Skills for Academic Success [1, 2]	1
MICR 350 & 350L	General Microbiology and General Microbiology Lab [2]	5
MICR 352 & 352L	Critical Skills in Microbiology and Critical Skills in Microbiology Laboratory Research [2]	5
MICR 452	Microbial Ecology [2,3]	3
MICR 470	Basic Immunology [2,3]	3
MICR 475	Virology [2,3]	3
MICR 480	Microbial Physiology [2,3]	3
MICR 482	Microbial Genetics [2,3]	3
MICR 485	Capstone Experience I: Reflecting and Planning [2]	1
MICR 486	Capstone Experience II: Reflection and Dissemination [2]	1
Laboratory Course [3]		
Select one from the following:		2-3
BIOC 474	Methods of Recombinant DNA Technology [2,3]	

MICR 445	Animal Cell Culture Techniques [2,3]	
MICR 460L	Microbial Pathogenesis Laboratory [2,3]	
MICR 471	Immunology and Serology Laboratory [2,3]	
Capstone Experience [3]		
Capstone Experience must include a minimum of 2 credits from the following:		2
MICR 493	Undergraduate Research	
MICR 496	Field Experience	
MICR 497	FE/Coop Ed/Internship	
Microbiology Electives [2,3]		
Select from the following:		8
MICR 379	Global Seminar (No more than 3 credits) [2]	
or MICR 492	Global Practicum: Study Abroad	
MICR 394	Individual Study (No more than 3 credits) [2]	
MICR 453	Food Microbiology [2,3]	
MICR 453L	Food Microbiology Laboratory [2]	
MICR 455	Microbial Biotechnology [2,3]	
MICR 460	Microbial Pathogenesis [2,3]	
MICR 463	Clinical Parasitology [2,3]	
MICR 481	Microbial Genomics with Computational Laboratory [2,3]	
MICR 491	Seminar (No more than 3 credits) [2]	
ANSC 475	One Health [2,3]	
BIOC 483	Cellular Signal Transduction Processes and Metabolic Regulations [2,3]	
BIOC 487	Molecular Biology of Gene Expression [2,3]	
BIOL 359	Evolution [2,3]	
BIOL 370	Cell Biology [2,3]	
BIOL 401	Science Communication [2,3]	
BIOL 483	Cellular Mechanisms of Diseases [2,3]	
MLS 435	Hematology [2,3]	
PH 474	Epidemiology [2,3]	
PLSC 307	History and Evolution of Wine in America [2,3]	
PLSC 431	Intermediate Genetics [2,3]	
PPTH 454	Diseases Of Field and Forage Crops [2,3]	
PPTH 460	Fungal Biology [2,3]	
SOIL 351	Soil Ecology [2,3]	
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342	Organic Chemistry II	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
PLSC 315 & 315L	Genetics and Genetics Laboratory	4

STAT 330	Introductory Statistics	3
Select one philosophy course from the following:		3
PHIL 111	Professional Responsibility and Ethics	
PHIL 210	Ethics	
PHIL 215	Contemporary Moral Issues	
PHIL 216	Business Ethics	
PHIL 225	Environmental Ethics	
PHIL 327	Ethics, Engineering, and Technology	
Select one math course from the following:		3-4
MATH 105	Trigonometry	
MATH 107	Precalculus	
MATH 146	Applied Calculus I	
MATH 165	Calculus I	
Total Credits		**90-91**

1

MICR189 is only required for first-time, first-year students - A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take MICR 189.

2

Course requires a grade of C or better.

3

Courses offered at the 600 level can be used in the B.S./M.S. accelerated program. The 600 level courses have additional outcomes/requirements for graduate level students. When students complete and submit the Accelerated Declaration form, the courses must be identified and no more than 15 credits of graduate coursework can be counted toward the B.S. degree.

Accelerated Undergraduate to Master's Degree Programs

- Students may participate in an accelerated program in the following areas:
  - B.S. Microbiology to Master of Science in Microbiology
  - B.S. Microbiology to Master of Public Health
- A 3.0 GPA is required for the B.S./M.S. accelerated programs
- Instructions to apply are found here (https://www.ndsu.edu/onestop/accelerated-degrees-undergraduate-graduate-programs/).
- A sample 5-year plan for interested students can be found on the department website (https://www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences/undergraduate-programs/pathways-success/).
- Students may complete a thesis-based or comprehensive study-based masters program. Outcomes of these master's programs can be found here (https://catalog.ndsu.edu/programs-study/graduate/microbiology/#degreerequirementstext).

Minor Requirements

Minor: Microbiology

Required Credits: 16

Code	Title	Credits
Required Courses		
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
Minor Electives - Select eleven (11) credits from the following:		11
MICR 352	Critical Skills in Microbiology	
MICR 352L	Critical Skills in Microbiology Laboratory Research	
MICR 379	Global Seminar (Global Seminar)	
MICR 445	Animal Cell Culture Techniques	
MICR 452	Microbial Ecology	
MICR 453	Food Microbiology	
MICR 455	Microbial Biotechnology	
MICR 460	Microbial Pathogenesis	

MICR 460L	Microbial Pathogenesis Laboratory	
MICR 463	Clinical Parasitology	
MICR 470	Basic Immunology	
MICR 471	Immunology and Serology Laboratory	
PH 474	Epidemiology	
MICR 475	Virology	
MICR 480	Microbial Physiology	
MICR 481	Microbial Genomics with Computational Laboratory	
MICR 482	Microbial Genetics	
MICR 491	Seminar (Seminar in Microbiology) *	
MICR 493	Undergraduate Research (Research Experience in Microbiology) *	
MICR 494	Individual Study (Teaching Experience in Microbiology) *	
MICR 496	Field Experience (Field Experience in Microbiology) *	
MICR 497	FE/Coop Ed/Internship (Internship in Microbiology) *	
Total Credits		**16**

*
No more than 3 credits of minor elective credit may come from courses numbered 491-499 to fulfill this requirement.

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a grade of 'C' or better in the courses used to satisfy the minor requirements.

Military Science

Department Information

- **Department Web Site:**
  www.ndsuarmyrotc.com (http://www.ndsuarmyrotc.com)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/military-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/military-science/)

The North Dakota State University Army Reserve Officers' Training Corps (ROTC) program provides college-trained officers for the Army, Army Reserve and Army National Guard. Army ROTC enhances a student's education. It provides unique educational opportunities by combining leadership and management theory with actual hands-on experience. Army ROTC helps the student to develop leadership skills to include self-discipline, physical stamina and advanced life skills — the qualities basic to success in any worthwhile career.

Career Opportunities

Students who complete the Army ROTC program may pursue careers as officers in the Army National Guard, Army Reserve, or the active Army. Students selected for active duty will receive a generous salary in excess of $55,000 per year, with housing and medical benefits, and will have opportunities to travel to assignments throughout the world. Students selected for reserve components receive more than $10,00 per year and amazing health insurance for attending for drills and annual training while pursuing their civilian careers. More importantly, the professional experience in management and leadership will enhance the student's marketability in any profession, civilian or military.

Program Description

The Army ROTC program consists of a two-year Basic Course and a two-year Advanced Course. The Basic Course is normally taken during the freshman and sophomore years. During these two years there is no military obligation for non-contracted cadets, and a student may withdraw at any time. Students who have taken Junior ROTC, have active duty military experience, or are currently a member of a Reserve/National Guard unit may receive placement credit for the Basic Course.

Military Science

Department Information

- **Department Web Site:**
  www.ndsuarmyrotc.com (http://www.ndsuarmyrotc.com)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/military-science/ (http://catalog.ndsu.edu/programs-study/undergraduate/military-science/)

Minor Requirements

Minor: Military Science

Required Credits: 25

Code	Title	Credits
Required Courses		
MS 101	Foundations of Officership	1
MS 102	Basic Leadership	1
MS 201	Individual Leadership Studies	2
MS 202	Leadership and Teamwork	2
MS 301	Leadership and Problem Solving	3
MS 302	Leadership and Ethics	3
MS 310	Leadership Laboratory	1
MS 320	Leadership Laboratory	1
MS 401	Leadership and Management	3
MS 402	Officership	3
MS 410	Leadership Laboratory	1
MS 420	Leadership Laboratory	1
Select one of the following history Courses:		**3**
NDSU Courses:		
HIST 103	U.S. to 1877	
HIST 104	U.S. Since 1877	
HIST 422	American Civil War and Reconstruction	
HIST 424	U.S. History 1917-1960	
Concordia Courses:		
HIST 111	United States in Perspective to 1865 (Concordia College)	
HIST 112	United States in Perspective since 1865 (Concordia College)	
HIST 314	U.S. Foreign Policy (3)	
HIST 338	Hitler's Germany (3)	
HIST 365	Global Issues (3)	
MSUM Courses:		
HIST 121	U.S. History I (3)	
HIST 122	U.S. History II (3)	
Total Credits		**25**

Minor Requirements and Notes

- This minor must be officially declared: see Office of Registration and Records.
- A minimum of 8 credits must be taken at NDSU.
- The following classes may be substituted for required classes after consultation with Military Science Dept Advisor - MS 110 Army ROTC Physical Fitness and MS 194 Individual Study.

Music

Department Information

- **Department Web Site:**
  www.ndsu.edu/performingarts/music/ (http://www.ndsu.edu/performingarts/music/)

- **Credential Offered:**
  B.A.; B.S.; B.Mus.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/music/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/music/)

North Dakota State University offers the most comprehensive degree programs for music majors in the region and provides outstanding musical opportunities for all NDSU students.

The Program

The NDSU Challey School of Music features excellent students, faculty, staff and facilities. The program has been continuously accredited by the National Association of Schools of Music since 1970 and has a strong tradition of excellence in ensembles dating back to 1904. Faculty and staff members are committed to providing outstanding musical opportunities for all NDSU students—whether they aspire to be professional musicians or only wish to take advantage of NDSU's many musical opportunities.

The Faculty

NDSU music faculty members have international credentials in performance, music education and academic studies. All full time faculty members have doctorates in music; adjunct faculty members and graduate students provide additional instruction to achieve a well-balanced program.

The Degrees

NDSU's Challey School of Music offers the largest variety of degree programs in the region, from liberal arts degrees with emphases in music to professional music degrees at the bachelor's, master's and doctoral levels.

Undergraduate music majors take courses in music theory, music literature, music history, and conducting; receive private lessons on a selected instrument and/or in voice; and participate in a major ensemble. Other courses are selected within chosen areas of concentration. In all programs, applied instrumental or vocal studies develop musicianship and performance ability. Students are accepted for private lessons depending upon demonstrated musical ability and available staff resources.

The Bachelor of Arts (B.A.) and Bachelor of Science (B.S.) in music are liberal arts degrees with an emphasis in music. In addition to a general education core and the music concentration, students complete either a two-year competency in a foreign language or a complementary minor degree. Students take a minimum of 15 credits in music electives.

The Bachelor of Music (B.Mus.) with an option in music education leads to K-12 vocal and instrumental certification for North Dakota public schools, and satisfies basic agreements in the primary area for Minnesota certifications.

The B.Mus. in performance leads to professional performing careers or preparation for graduate school. Students select a concentration in instrumental, vocal or piano studies.

The B.Mus in composition leads to professional careers or preparation for graduate school.

NDSU also offers the Master of Music and the Doctor of Musical Arts degrees.

Further, the School of Music offers a minor in music consisting of 20 credit hours of music classes, including applied study, ensembles, academic studies and electives.

Career Opportunities

Degree programs in music education prepare students for opportunities as elementary, high school or college teachers, while performance degree students usually seek performing or conducting careers. Graduates often choose careers as professional teachers, instrumentalists or vocalists, and conductors. There are also more general opportunities in various music industries.

Music Performance Opportunities

All music ensembles are open to any NDSU student without regard to major and provide course credit (generally one semester hour for each group listed). Ensembles are some of the most rewarding experiences in college, and all students with musical interests are encouraged to participate.

The **Gold Star Marching Band** plays for all home NDSU football games and marches in special events during fall semester. The group rehearses three days per week and is open to all students.

The **Concert Choir** meets five days per week, both fall and spring semesters. Open by audition, the group tours regionally or nationally on an annual basis and to European countries every three years.

The **NDSU Wind Symphony** is NDSU's large concert ensemble for wind and percussion instruments. Members meet both fall and spring semesters and tour annually. Open by audition.

A smaller ensemble, **Madrigal Singers,** performs repertoire from the renaissance through contemporary periods. This auditioned group meets three days per week fall and spring semesters and produces the annual Madrigal Dinners in December and tours with the Concert Choir. Members are auditioned from Concert Choir.

The **Jazz Ensembles** are two jazz big bands, generally of about 20 musicians each. Ensembles meet two times per week fall and spring semesters. Open by audition.

In **Opera Theatre,** opera scenes are rehearsed and produced each semester. This auditioned group meets three times per week. The School of Music traditionally produces a fully staged opera or musical every year in the spring semester.

A second concert band, **University Band** is open to all students by audition for section placement. University Band meets three times per week and has two concerts each semester. The **University Symphony Orchestra** performs 2 concerts each semester.

The **University Chamber Singers** is an auditioned mixed choir of students from many different majors and disciplines. They perform a wide variety of music and sing in at least two concerts each semester. There is an audition for this ensemble.

Cantemus performs SA literature from all periods and meets two times per week**. NDSU Statesmen** performs TB literature from all periods and meets two times per week. Both choirs perform at least two concerts each semester**.** There is no audition for these ensembles.

Chamber ensembles include the percussion ensemble, brass ensemble, brass chamber ensembles, woodwind chamber ensembles (including flute quartets, clarinet ensembles, saxophone quartets and mixed woodwinds), vocal chamber ensembles, piano chamber ensembles and jazz combos.

The Curricula

Music degree programs vary because of the numerous options available. All music degrees, however, feature a general core of music classes that includes applied lessons, ensembles, supportive music courses, academic music studies and electives. Curriculum guides are available online and from the School of Music.

Sample Program Guide

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Freshman			
Fall	**Credits**	**Spring**	**Credits**
MUSC 130	3	MUSC 103	3
MUSC 132	1	MUSC 131	3
MUSC 160[2]	1	MUSC 133	1
MUSC 174[2]	1	MUSC 1XX Applied Study	1
MUSC 189	1	MUSC 161[Only required for vocal majors]	1
MUSC 1XX Applied Lessons	1	Major Ensemble	1
Major Ensemble	1	MUSC 175[Only required for vocal majors]	1
ENGL 110	3	ENGL 120	3
COMM 110	3	Gen Ed Social/Behavioral Sci	3
	15		**17**
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 2XX Applied Study	1	MUSC 2XX Applied Study	1
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
Gen Ed Quantitative Reasoning	3	Gen Ed Social/Behavioral Sci & Cultural Diversity	3
Minor elective/Language elective	3	Minor elective/Language elective	3

Minor elective/Language elective		3			
		15			**12**
Junior					
Fall	**Credits**		**Spring**	**Credits**	
MUSC 340		3	MUSC 341		3
MUSC 3XX Applied Study		1	MUSC 3XX Applied Study		1
MUSC 3XX Major Ensemble		1	MUSC 3XX Major Ensemble		1
Minor elective/Language elective		3	Minor elective/Language elective		3
Gen Ed Science/Tech w/ Lab		4	Music Elective course[3]		2-6
Gen Ed Upper Division Writing		3	Gen Ed Humanities/Fine Arts		3
			Free Elective		3
		15			**16-20**
Senior					
Fall	**Credits**		**Spring**	**Credits**	
Music Elective		3	MUSC 385		3
Minor requirement or Language III		3	Capstone Experience		1
Gen Ed Science/Tech & Global Perspectives		3	Music Elective		3
Gen Ed Wellness		2	Music Elective		3
Gen Ed Science/Tech		3	Minor elective/Language elective		3
			Free Elective		3
		14			**16**

Total Credits: 120-124

1

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2

3

Vocal needs 2 credits; Instrumental needs 6 credits

Degree Requirements and Notes

- Music majors may not declare a music minor.
- A grade of 'C' or better is required in all MUSC prefix courses.
- Arts, Humanities and Social Sciences College Requirements: An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree
- Bachelor of Science (B.S) Degree - The completion of a minor program of study, a second major, or a second degree is required.
- Bachelor of Arts (B.A.) Degree - Second year language proficiency at college level required.
- MUSC 189 is only required for first-time, first-year students--A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take MUSC 189.
- B.A./B.S. Recital Capstone or Individual Study Capstone is fulfilled by registration in MUSC 380 (https://bulletin.ndsu.edu/search/?P=MUSC%20380) Recital, MUSC 480 (https://bulletin.ndsu.edu/search/?P=MUSC%20480) Recital, or MUSC 494 (https://bulletin.ndsu.edu/search/?P=MUSC%20494) Individual Study. The MUSC 494 (https://bulletin.ndsu.edu/search/?P=MUSC%20494) Individual Study registration is approved by the music faculty and supervised by the adviser. Possibilities include:
  - Half (MUSC 380 (https://bulletin.ndsu.edu/search/?P=MUSC%20380) Recital) or full (MUSC 480 (https://bulletin.ndsu.edu/search/?P=MUSC%20480) Recital) recital with program notes.

- Approved research project on a topic related to music; requires a formal written document (MUSC 494 (https://bulletin.ndsu.edu/search/?P=MUSC%20494) Individual Study).
- Approved internship, such as directing an ensemble (e.g. church choir), teaching at the NDSU Academy, observed regularly by the advisor, with a formal written document of the experience (MUSC 494 (https://bulletin.ndsu.edu/search/?P=MUSC%20494) Individual Study).
- Approved "lecture recital" with a formal presentation. Lecture recital should be at least the same length as a half recital (MUSC 494 (https://bulletin.ndsu.edu/search/?P=MUSC%20494) Individual Study)
- Performance or major opera role or a major solo with ensemble in a formal concert, accompanied by a summary document (MUSC 494 (https://bulletin.ndsu.edu/search/?P=MUSC%20494) Individual Study)

Sample Program Guide

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STUDENTS ENTERING AS A FRESHMAN IN AN ODD-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
FRESHMAN - ODD YEAR - FALL SEMESTER		FRESHMAN - EVEN YEAR - SPRING SEMESTER	
MUSC 130	3	MUSC 103 (Gen Ed category A)	3
MUSC 132	1	MUSC 131	3
MUSC 160 (Up to 2 semesters of MUSC 165 with permission)	1	MUSC 133	1
MUSC 1XX Applied Study	1	MUSC 161	1
MUSC 189	1	MUSC 1XX Applied Study	1
MUSC 3XX Major Ensemble	1	MUSC 173	1
MUSC XXX Minor Ensemble	1	MUSC 3XX Major Ensemble	1
ENGL 110 (Gen Ed category C)	3	MUSC XXX Minor Ensemble	1
COMM 110 (Gen Ed category C)	3	ENGL 120 (Gen Ed category C)	3
	15		**15**

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
SOPHOMORE - EVEN YEAR - FALL SEMESTER		SOPHOMORE - ODD YEAR - SPRING SEMESTER	
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1
MUSC 2XX Applied Study	1	MUSC 2XX Applied Study	1
MUSC 273	1	MUSC 273	2
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC 1XX Minor Ensemble	1	MUSC 1XX Minor Ensemble	1
Social & Behavioral Sciences (Gen Ed category B)	3	Social & Behavioral Sciences (Gen Ed category B - Cultural Diversity)	3
Science & Technology (Gen Ed category S)	3	Science & Technology (Gen Ed category S with Lab)	4
	15		**17**

Junior					
Fall	**Credits**		**Spring**	**Credits**	
JUNIOR - ODD YEAR - FALL SEMESTER			JUNIOR - EVEN YEAR - SPRING SEMESTER		
MUSC 340		3	MUSC 341		3
MUSC 3XX Applied Study		1	MUSC 3XX Major Ensemble		1
MUSC 373[1] credit of pedadogy		3	MUSC 3XX Applied Study		1
Science & Technology (Gen Ed category S - Global Perspectives)		3	MUSC 373 (1 credit of pedagogy)		3
MUSC 3XX Major Ensemble		1	MUSC 380		1
Jazz Studies		1	MUSC 441		2
MUSC 411, 430, or 434		3	Jazz Studies		1
			ENGL 322 (or any upper division English course approved by adviser)(Gen Ed category C)		3
		15			**15**

Senior					
Fall	**Credits**		**Spring**	**Credits**	
SENIOR - EVEN YEAR - FALL SEMESTER			SENIOR - ODD YEAR - SPRING SEMESTER		
MUSC 331		2	MUSC 351		2
MUSC 431[need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431, MUSC 434]		3	MUSC 385		3
MUSC 4XX Applied Studies		1	MUSC 4XX Applied Study		1
MUSC 473		3	MUSC 473		3
MUSC 3XX Major Ensemble		1	MUSC 480		1
Jazz Studies		1	MUSC 3XX Major Ensemble		1
Wellness (Gen Ed category W)		2	Jazz Studies		1
			Quantitative Reasoning (Gen Ed category R)		3
		13			**15**

Total Credits: 120

STUDENTS ENTERING AS A FRESHMAN IN AN EVEN-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman					
Fall	**Credits**		**Spring**	**Credits**	
FRESHMAN - EVEN YEAR - FALL SEMESTER			MUSC 103(Gen Ed category A)		3
MUSC 130		3	MUSC 131		3
MUSC 132		1	MUSC 133		1
MUSC 160 (Up to 2 semesters of MUSC 165 with permission)		1	MUSC 161		1
MUSC 1XX Applied Study		1	MUSC 1XX Applied Study		1
MUSC 189		1	MUSC 173		1
MUSC 3XX Major Ensemble		1	MUSC 3XX Major Ensemble		1
MUSC XXX Minor Ensemble		1	MUSC XXX Minor Ensemble		1

ENGL 110 (Gen Ed category C)	3	ENGL 120 (Gen Ed category C)	3
COMM 110 (Gen Ed category C)	3		
	15		**15**

Sophomore

Fall	Credits	Spring	Credits
SOPHOMORE - ODD YEAR - FALL SEMESTER		SOPHOMORE - EVEN YEAR - SPRING SEMESTER	
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1
MUSC 2XX Applied Study	1	MUSC 2XX Applied Study	1
MUSC 273	1	MUSC 273	2
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC XXX Minor Ensemble	1	MUSC XXX Minor Ensemble	1
Social & Behavioral Sciences (Gen Ed category B)	3	Science & Technology (Gen Ed category S with Lab)	4
Science & Technology (Gen Ed category S)	3		
	15		**14**

Junior

Fall	Credits	Spring	Credits
JUNIOR - EVEN YEAR - FALL SEMESTER		JUNIOR - ODD YEAR - SPRING SEMESTER	
MUSC 331	2	MUSC 341	3
MUSC 340 counts as a Humanities and Fine Arts Gen Ed	3	MUSC 351	2
MUSC 3XX Applied Study	1	MUSC 3XX Applied Study	1
MUSC 373 1 credit of pedadogy	3	MUSC 373 (1 credit of pedadogy)	3
MUSC 431 need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431, MUSC 434	3	MUSC 380	1
MUSC 3XX Major Ensemble	1	MUSC 385	3
Jazz Studies	1	MUSC 3XX Major Ensemble	1
Wellness (Gen Ed category W)	2	Jazz Studies	1
	16		**15**

Senior

Fall	Credits	Spring	Credits
SENIOR - ODD YEAR - FALL SEMESTER		SENIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 411	3	MUSC 441	2
MUSC 4XX Applied Study	1	MUSC 4XX Applied Study	1
MUSC 473	3	MUSC 473	3
MUSC 3XX Major Ensemble	1	MUSC 480	1
Jazz Studies	1	MUSC 3XX Major Ensemble	1
ENGL 322 (or any upper division English course approved by adviser) (Gen Ed category C)	3	Jazz Studies	1

Social & Behavioral Sciences (Gen Ed category B - Cultural Diversity)	3	Quantitative Reasoning (Gen Ed category R)	3
		Science & Technology (Gen Ed category S - Global Perspectives)	3
	15		**15**

Total Credits: 120

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STUDENTS ENTERING AS A FRESHMAN IN AN ODD-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
FRESHMAN - ODD YEAR - FALL SEMESTER		MUSC 103 (Gen Ed category A)	3
MUSC 130	3	MUSC 131	3
MUSC 132	1	MUSC 133	1
MUSC 165	1	MUSC 165	1
MUSC 189[1]	1	MUSC 173	1
MUSC 443	3	MUSC 423	3
ENGL 110 (Gen Ed category C)	3	ENGL 120 (Gen Ed category C)	3
COMM 110 (Gen Ed category C)	3		
Wellness (Gen Ed category W)	2		
	17		**15**

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
SOPHOMORE - EVEN YEAR - FALL SEMESTER		SOPHOMORE - ODD YEAR - SPRING SEMESTER	
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 265	1	MUSC 265	1
MUSC 273	2	MUSC 273	2
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC 3XX Minor Ensemble	1	MUSC XXX Minor Ensemble	1
Social & Behavioral Sciences (Gen Ed category B)	3	Social & Behavioral Sciences (Gen Ed category B - Cultural Diversity)	3
Science & Technology (Gen Ed category S with Lab)	4	Science & Technology (Gen Ed category S)	3
	16		**15**

Junior			
Fall	**Credits**	**Spring**	**Credits**
JUNIOR - ODD YEAR - FALL SEMESTER		JUNIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 340 (Gen Ed category A)	3	MUSC 341	3

MUSC 411 or 434	3	MUSC 346, 442, or 441	2
MUSC 443	3	MUSC 365	1
MUSC 365	1	MUSC 373	2
MUSC 373	2	MUSC 3XX Minor Ensemble	1
MUSC 3XX Minor Ensemble	1	MUSC 380	1
ENGL 322 (or any upper division English course approved by adviser)(Gen Ed category C)	3	MUSC 385	3
		MUSC 423	3
		Music Elective Choose from MUSC 166, 319, 321 or 494	1
	16		**17**

Senior

Fall	Credits	Spring	Credits
SENIOR - EVEN YEAR - FALL SEMESTER		SENIOR - ODD YEAR - SPRING SEMESTER	
MUSC 352 or 351	2	MUSC 423	3
MUSC 431 need 3 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431, MUSC 434	3	MUSC 430 need 3 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431, MUSC 434	3
MUSC 465	1	MUSC 465	1
MUSC 473	2	MUSC 473	3
MUSC 3XX Minor Ensemble	1	MUSC 480	1
Science & Technology(Gen Ed category S - Global Perspectives)	3	MUSC 3XX Minor Ensemble	1
Music Elective Choose from MUSC 166, 319, 321 or 494	1	Music Elective Choose from MUSC 166, 319, 321 or 494	1
	13		**13**

Total Credits: 122

1

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*

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STUDENTS ENTERING AS A FRESHMAN IN AN EVEN-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman

Fall	Credits	Spring	Credits
FRESHMAN - EVEN YEAR - FALL SEMESTER		MUSC 103(Gen Ed category A)	3
MUSC 130	3	MUSC 131	3
MUSC 132	1	MUSC 133	1
MUSC 165	1	MUSC 165	1
MUSC 189[1]	1	MUSC 173	1
ENGL 110(Gen Ed category C)	3	ENGL 120(Gen Ed category C)	3
COMM 110(Gen Ed category C)	3	Wellness (Gen Ed category W)	2

Social & Behavioral Sciences (Gen Ed category B)	3		
	15		**14**

Sophomore

Fall	Credits	Spring	Credits
SOPHOMORE - ODD YEAR - FALL SEMESTER		SOPHOMORE - EVEN YEAR - SPRING SEMESTER	
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 265	1	MUSC 265	1
MUSC 273	2	MUSC 273	2
MUSC 443	3	MUSC 423	3
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC XXX Minor Ensemble	1	MUSC XXX Minor Ensemble	1
Science & Technology (Gen Ed category S with Lab)	4	Science & Technology (Gen Ed category S)	3
	16		**15**

Junior

Fall	Credits	Spring	Credits
JUNIOR - EVEN YEAR - FALL SEMESTER		JUNIOR - ODD YEAR - SPRING SEMESTER	
MUSC 340(Gen Ed category A)	3	MUSC 341	3
MUSC 431need 3 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431, MUSC 434	3	MUSC 365	1
MUSC 365	1	MUSC 373	2
MUSC 373	2	MUSC 380	1
MUSC XXX Minor Ensemble	1	MUSC 385	3
Social & Behavioral Sciences (Gen Ed category B - Cultural Diversity)	3	MUSC 430need 3 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431, MUSC 434	3
ENGL 322 (or any upper division English course approved by adviser)(Gen Ed category C)	3	MUSC XXX Minor Ensemble	1
		Music ElectiveChoose from MUSC 166, 319, 321 or 494	1
	16		**15**

Senior

Fall	Credits	Spring	Credits
SENIOR - ODD YEAR - FALL SEMESTER		SENIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 352 or 351	2	MUSC 423	3
MUSC 442, 346, or 441	2	MUSC 434 or 411	3
MUSC 443	3	MUSC 465	1
MUSC 465	1	MUSC 473	3
MUSC 473	3	MUSC 480	1
MUSC XXX Minor Ensemble	1	MUSC XXX Minor Ensemble	1

Science & Technology (Gen Ed category S - Global Perspectives)	3	Social & Behavioral Sciences (Gen Ed category B)	3
		Music Elective Choose from MUSC 166, 319, 321 or 494	1
	15		**16**

Total Credits: 122

1

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*

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FOR FRESHMAN ENROLLING FOR THE FIRST TIME IN ODD-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
FRESHMAN - ODD YEAR - FALL SEMESTER		FRESHMAN - EVEN YEAR - SPRING SEMESTER	
MUSC 130	3	MUSC 103 (Gen Ed category A)	3
MUSC 132	1	MUSC 131	3
MUSC 160 (Up to 2 semesters of MUSC 165 with permission)	1	MUSC 133	1
MUSC 167	1	MUSC 161	1
MUSC 174	1	MUSC 167	1
MUSC 189[1]	1	MUSC 173	1
MUSC 3XX Major Ensemble	1	MUSC 175	1
ENGL 110 (Gen Ed category C)	3	MUSC 3XX Major Ensemble	1
COMM 110 (Gen Ed category C)	3	ENGL 120 (Gen Ed category C)	3
Wellness (Gen Ed category W)	2		
	17		**15**

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
SOPHOMORE - EVEN YEAR - FALL SEMESTER		SOPHOMORE - ODD YEAR - SPRING SEMESTER	
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1
MUSC 267	1	MUSC 267	1
MUSC 273	2	MUSC 273	2
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1

Social & Behavioral Sciences (Gen Ed category B)	3	Social & Behavioral Sciences (Gen Ed category B - Cultural Diversity)	3
Science & Technology (Gen Ed category S with Lab)	4	Science & Technology (Gen Ed category S)	3
		Quantitative Reasoning (Gen Ed category R)	3
	16		**18**

Junior

Fall	Credits	Spring	Credits
JUNIOR - ODD YEAR - FALL SEMESTER		JUNIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 340 (Gen Ed category A)	3	MUSC 341	3
MUSC 349	2	MUSC 346	2
MUSC 367	1	MUSC 367	1
MUSC 373	2	MUSC 373	2
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC 3XX Minor Ensemble	1	MUSC 3XX Minor Ensemble	1
FREN 101 (or German I)	4	MUSC 380	1
ENGL 322 (or any upper division English course approved by adviser) (Gen Ed category C)	3	MUSC 385	3
		FREN 102 (or German II) Global Perspectives Gen Ed	4
	17		**18**

Senior

Fall	Credits	Spring	Credits
SENIOR - EVEN YEAR - FALL SEMESTER		SENIOR - ODD YEAR - SPRING SEMESTER	
MUSC 431 need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431, MUSC 434	3	MUSC 430, 411, or 431	3
MUSC 467	1	MUSC 442	2
MUSC 473 (Students may take THEA 268 Acting the Song I instead of 3 credits of Supplementary Applied Study)	2	MUSC 467	1
MUSC 3XX Major Ensemble	1	MUSC 473	3
MUSC 3XX Minor Ensemble	1	MUSC 480	1
GERM 101 (or French I)	4	MUSC 3XX Major Ensemble	1
Science & Technology (Gen Ed category S)	3	MUSC 3XX Minor Ensemble	1
		GERM 102 (or French II)	4
	15		**16**

Total Credits: 132

1

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*
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FOR FRESHMAN ENROLLING FOR THE FIRST TIME IN AN EVEN-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
FRESHMAN - EVEN YEAR - FALL SEMSTER		FRESHAMN - ODD YEAR - SPRING SEMESTER	
MUSC 130	3	MUSC 103 (Gen Ed category A)	3
MUSC 132	1	MUSC 131	3
MUSC 160	1	MUSC 133	1
MUSC 167	1	MUSC 161	1
MUSC 174	1	MUSC 167	1
MUSC 189	1	MUSC 173	1
MUSC 3XX Major Ensemble	1	MUSC 175	1
ENGL 110 (Gen Ed category C)	3	MUSC 3XX Major Ensemble	1
COMM 110 (Gen Ed category C)	3	ENGL 120 (Gen Ed category C)	3
Wellness (Gen Ed category W)	2		
	17		**15**

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
SOPHOMORE - ODD YEAR - FALL SEMESTER		SOPHOMORE - EVEN YEAR - SPRING SEMESTER	
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1
MUSC 267	1	MUSC 267	1
MUSC 273	2	MUSC 273	2
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
Social & Behavioral Sciences (Gen Ed category B)	3	Social & Behavioral Sciences (Gen Ed category B - Cultural Diversity)	3
Science & Technology (Gen Ed category S with Lab)	4	Science & Technology (Gen Ed category S)	3
		Quantitative Reasoning (Gen Ed category R)	3
	16		**18**

Junior			
Fall	**Credits**	**Spring**	**Credits**
JUNIOR - EVEN YEAR - FALL SEMESTER		JUNIOR - ODD YEAR - SPRING SEMESTER	
MUSC 340 (Gen Ed category A)	3	MUSC 341	3
MUSC 367	1	MUSC 367	1
MUSC 373	2	MUSC 373	2
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC 3XX Minor Ensemble	1	MUSC 3XX Minor Ensemble	1
FREN 101 (or German I)	4	MUSC 380	1

ENGL 322 (or any upper division English course approved by adviser)(Gen Ed category C)	3	MUSC 430	3
		MUSC 442	2
		FREN 102 (or German II)(Global Perspectives Gen Ed	4
	15		**18**

Senior			
Fall	**Credits**	**Spring**	**Credits**
SENIOR - ODD YEAR - FALL SEMESTER		SENIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 349	2	MUSC 346	2
MUSC 3XX Major Ensemble	1	MUSC 385	3
MUSC 3XX Minor Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC 411	3	MUSC 3XX Minor Ensemble	1
MUSC 467	1	MUSC 467	1
MUSC 473	2	MUSC 473	3
GERM 101 (or French I)	4	MUSC 480	1
Science & Technology (Gen Ed category S)	3	GERM 102 (or French II)	4
	17		**16**

Total Credits: 132

1

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

*

Music majors may not declare a music minor.

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Students entering as a freshmen in an odd year fall

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
MUSC 130	3	MUSC 103(Gen Ed category A)	3
MUSC 132	1	MUSC 131	3
MUSC 160 (Up to 2 semesters of MUSC 165 with permission))	1	MUSC 133	1
MUSC 189[1]	1	MUSC 161	1
MUSC 1XX Applied Study	1	MUSC 1XX Applied Study	1
MUSC 3XX Major Ensemble	1	MUSC 166	1
ENGL 110(Gen Ed category C)	3	MUSC 3XX Major Ensemble	1
COMM 110(Gen Ed category C)	3	ENGL 120(Gen Ed category C)	3

Wellness (Gen Ed category W)		2			
		16			**14**
Sophomore					
Fall	**Credits**		**Spring**	**Credits**	
MUSC 230		3	MUSC 231		3
MUSC 232		1	MUSC 233		1
MUSC 260		1	MUSC 261		1
MUSC 2XX Applied Study		1	MUSC 2XX Applied Study		1
MUSC 266		1	MUSC 266		1
MUSC 273		1	MUSC 273		1
MUSC 3XX Major Ensemble		1	MUSC 3XX Major Ensemble		1
Music Elective		1	Music Elective		3
Science & Technology (Gen Ed category S with Lab)		4	Science & Technology (Gen Ed category S)		3
		14			**15**
Junior					
Fall	**Credits**		**Spring**	**Credits**	
MUSC 340(Gen Ed category A)		3	MUSC 341		3
MUSC 1XX Minor Ensemble		1	MUSC 3XX Applied Study		1
MUSC 3XX Major Ensemble		1	MUSC 366		1
MUSC 3XX Applied Study		1	MUSC 373		1
MUSC 366		1	MUSC 385		3
MUSC 373		1	MUSC 3XX Major Ensemble		1
MUSC 411, 431, or 434		3	MUSC XXX Minor Ensemble		1
ENGL 322 (or any upper division English course approved by adviser)(Gen Ed category C)		3	Social & Behavioral Sciences (Gen Ed category B)		3
Social & Behavioral Sciences (Gen Ed category B - Cultural Diversity)		3			
		17			**14**
Senior					
Fall	**Credits**		**Spring**	**Credits**	
MUSC 331		2	MUSC 430		3
MUSC 352 or 351		2	MUSC 466		1
MUSC 466		1	MUSC 473		1
MUSC 473		1	MUSC 480		1
Minor Ensemble		1	MUSC 494 (Capstone)		1
Music Elective		3	Music Elective		3
Science & Technology (Gen Ed category S - Global Perspectives)		3	Minor Ensemble		1
Free Elective		3	Quantitative Reasoning (Gen Ed category R)		3
		16			**14**

Total Credits: 120

1

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

Students entering as a freshman in an even year fall

A grade of 'C' or better is required in all MUSC prefix courses

Freshman				
Fall	**Credits**		**Spring**	**Credits**
MUSC 130		3	MUSC 103 (Gen Ed category A)	3
MUSC 132		1	MUSC 131	3
MUSC 160 (Up to 2 semesters of MUSC 165 with permission))		1	MUSC 133	1
MUSC 189[1]		1	MUSC 161	1
MUSC 1XX Applied Study		1	MUSC 1XX Applied Study	1
MUSC 3XX Major Ensemble		1	MUSC 166	1
ENGL 110 (Gen Ed category C)		3	MUSC 3XX Major Ensemble	1
COMM 110 (Gen Ed category C)		3	ENGL 120 (Gen Ed category C)	3
Wellness (Gen Ed category W)		2		
		16		**14**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
MUSC 230		3	MUSC 231	3
MUSC 232		1	MUSC 233	1
MUSC 260		1	MUSC 261	1
MUSC 2XX Applied Study		1	MUSC 2XX Applied Study	1
MUSC 266		1	MUSC 266	1
MUSC 273		1	MUSC 273	1
MUSC 3XX Major Ensemble		1	MUSC 3XX Major Ensemble	1
Music Elective		1	Music Elective	3
Science & Technology (Gen Ed category S with Lab)		4	Science & Technology (Gen Ed category S)	3
		14		**15**
Junior				
Fall	**Credits**		**Spring**	**Credits**
MUSC 331		2	MUSC 341	3
MUSC 340 (Gen Ed category A)		3	MUSC 3XX Applied Study	1
MUSC 366		1	MUSC 366	1
MUSC 373		1	MUSC 373	1
MUSC 3XX Applied Study		1	MUSC 430, 431, or 434	3
MUSC 3XX Major Ensemble		1	MUSC 3XX Major Ensemble	1
MUSC XXX Minor Ensemble		1	MUSC XXX Minor Ensemble	1
ENGL 322 (or any upper division English course approved by adviser) (Gen Ed category C)		3	Social & Behavioral Sciences (Gen Ed category B)	3

Social & Behavioral Sciences (Gen Ed category B - Cultural Diversity)	3		
	16		**14**

Senior			
Fall	**Credits**	**Spring**	**Credits**
MUSC 352	2	MUSC 385	3
MUSC 411, 431, or 434	3	MUSC 466	1
MUSC 466	1	MUSC 473	1
MUSC 473	1	MUSC 480	1
Minor Ensemble	1	MUSC 494 (Capstone)	1
Music Elective	3	Music Elective	3
Science & Technology (Gen Ed category S - Global Perspectives)	3	Minor Ensemble	1
Free Elective	3	Quantitative Reasoning (Gen Ed category R)	3
	17		**14**

Total Credits: 120

1

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

Music

Department Information

- **Department Web Site:**
  www.ndsu.edu/performingarts/music/ (http://www.ndsu.edu/performingarts/music/)
- **Credential Offered:**
  B.S.; B.A.; B.Mus.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/music/ (http://catalog.ndsu.edu/programs-study/undergraduate/music/)

Major Requirements

Major: Music

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

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Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

A grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements		
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success [1]	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 385	Music Entrepreneurship	3
Capstone Experience (choose from following:) [2]		**1**
MUSC 380	Recital	
MUSC 480	Recital	
MUSC 494	Individual Study	
Applied Music: Select 6 credits from the following:		**6**
MUSC 165	Applied Piano	
MUSC 167	Applied Voice	
MUSC 168	Applied Wind Instruments	
MUSC 169	Applied Percussion Instruments	
MUSC 170	Applied Upper Strings	
MUSC 171	Applied Lower Strings	
MUSC 172	Applied Guitar	

MUSC 173	Supplementary Applied Study	
MUSC 265	Applied Piano	
MUSC 267	Applied Voice	
MUSC 268	Applied Wind Instruments	
MUSC 269	Applied Percussion Instruments	
MUSC 270	Applied Upper Strings	
MUSC 271	Applied Lower Strings	
MUSC 272	Applied Guitar	
MUSC 273	Supplementary Applied Study	
MUSC 365	Applied Piano	
MUSC 367	Applied Voice	
MUSC 368	Applied Wind Instruments	
MUSC 369	Applied Percussion Instruments	
MUSC 370	Applied Upper Strings	
MUSC 371	Applied Lower Strings	
MUSC 372	Applied Guitar	
MUSC 373	Supplementary Applied Study	
MUSC 465	Applied Piano	
MUSC 467	Applied Voice	
MUSC 468	Applied Wind Instruments	
MUSC 469	Applied Percussion Instruments	
MUSC 470	Applied Upper Strings	
MUSC 471	Applied Lower Strings	
MUSC 472	Applied Guitar	
MUSC 473	Supplementary Applied Study	
Major Ensemble: Select 6 credits from the following:		**6**
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 215	University Chamber Singers	
MUSC 303	Wind Symphony	
MUSC 304	University Symphony Orchestra	
MUSC 306	Concert Choir	
Music Electives or Emphasis Courses		**15**
Total Credits		**57**

1

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

2

B.A./B.S. Recital Capstone or Individual Study Capstone is fulfilled by registration in MUSC 380 Recital, MUSC 480 Recital, or MUSC 494 Individual Study. The MUSC 494 Individual Study registration is approved by the music faculty and supervised by the adviser. Possibilities include:

- Half (MUSC 380 Recital) or full (MUSC 480 Recital) recital with program notes.
- Approved research project on a topic related to music; requires a formal written document (MUSC 494 Individual Study).
- Approved internship, such as directing an ensemble (e.g. church choir), teaching at the NDSU Academy, observed regularly by the advisor, with a formal written document of the experience (MUSC 494 Individual Study).
- Approved “lecture recital” with a formal presentation. Lecture recital should be at least the same length as a half recital (MUSC 494 Individual Study)
- Performance or major opera role or a major solo with ensemble in a formal concert, accompanied by a summary document (MUSC 494 Individual Study)

Degree Requirements and Notes

- Music majors may not declare a music minor.

Major Requirements

Major: Music - Instrumental Performance

Degree Type: B.Mus.
Minimum Degree Credits to Graduate: 128

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

A grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements		
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1

MUSC 189	Skills for Academic Success [1]	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 341	Music History II	3
MUSC 380	Recital	1
MUSC 340	Music History I	3
MUSC 351	Instrumental Conducting & Literature	2
MUSC 385	Music Entrepreneurship	3
MUSC 480	Recital	1
Advanced Theory - select 2 of the following 3 courses		6
MUSC 411	Form and Analysis	
MUSC 430	Counterpoint	
MUSC 431	Contemporary Harmonic Techniques	
Pedagogy: Select 2 credits from the following:		2
MUSC 173	Supplementary Applied Study	
MUSC 273	Supplementary Applied Study	
MUSC 373	Supplementary Applied Study	
MUSC 473	Supplementary Applied Study	
Applied Music		
Select 22 credits from the following: (2 semesters each of 100 level, 200 level, 300 level; 1 semester of 400 level)		22
Wind Instruments:		
MUSC 168 & MUSC 173	Applied Wind Instruments and Supplementary Applied Study	
MUSC 268 & MUSC 273	Applied Wind Instruments and Supplementary Applied Study	
MUSC 368 & MUSC 373	Applied Wind Instruments and Supplementary Applied Study	
MUSC 468 & MUSC 473	Applied Wind Instruments and Supplementary Applied Study	
Percussion:		
MUSC 169 & MUSC 173	Applied Percussion Instruments and Supplementary Applied Study	
MUSC 269 & MUSC 273	Applied Percussion Instruments and Supplementary Applied Study	
MUSC 369 & MUSC 373	Applied Percussion Instruments and Supplementary Applied Study	
MUSC 469 & MUSC 473	Applied Percussion Instruments and Supplementary Applied Study	
Upper Strings:		
MUSC 170 & MUSC 173	Applied Upper Strings and Supplementary Applied Study	
MUSC 270 & MUSC 273	Applied Upper Strings and Supplementary Applied Study	
MUSC 370 & MUSC 373	Applied Upper Strings and Supplementary Applied Study	
MUSC 470 & MUSC 473	Applied Upper Strings and Supplementary Applied Study	
Lower Strings:		
MUSC 171 & MUSC 173	Applied Lower Strings and Supplementary Applied Study	
MUSC 271 & MUSC 273	Applied Lower Strings and Supplementary Applied Study	

MUSC 371 & MUSC 373	Applied Lower Strings and Supplementary Applied Study	
MUSC 471 & MUSC 473	Applied Lower Strings and Supplementary Applied Study	
Guitar:		
MUSC 172 & MUSC 173	Applied Guitar and Supplementary Applied Study	
MUSC 272 & MUSC 273	Applied Guitar and Supplementary Applied Study	
MUSC 372 & MUSC 373	Applied Guitar and Supplementary Applied Study	
MUSC 472 & MUSC 473	Applied Guitar and Supplementary Applied Study	
Instrumental Track		
MUSC 331	Instrumental Arranging	2
Literature		
MUSC 344	Wind Band Literature	2
or MUSC 441	Symphonic Literature	
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 357	Marching Band Methods and Techniques	
MUSC 364	Jazz Improvisation	
MUSC 384	Composition I	
MUSC 484	Composition II	
Major Ensemble: Select 8 credits from the following:		8
MUSC 303	Wind Symphony (or as approved by adviser)	
MUSC 304	University Symphony Orchestra (for string majors)	
Minor Ensembles: Select 4 credits from the following:		4
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 311	Jazz Ensemble	
MUSC 314	Brass Chamber Ensemble	
MUSC 315	Woodwind Chamber Ensemble	
MUSC 316	String Chamber Ensemble	
MUSC 318	Mixed Chamber Ensemble	
MUSC 322	Jazz Combo	
Or as approved by adviser		
Total Credits		**87**

[1]

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Degree Notes

- Music majors may not declare a music minor.

Major Requirements

Major: Music - Piano Performance

Degree Type: B.Mus.
Minimum Degree Credits to Graduate: 128

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

A grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements		
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success [1]	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3

MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 351	Instrumental Conducting & Literature	2
or MUSC 352	Choral Conducting & Literature	
MUSC 385	Music Entrepreneurship	3
MUSC 380	Recital	1
MUSC 480	Recital	1
Upper-Division Music Theory: Select 9 credits from the following:		**9**
MUSC 411	Form and Analysis	
MUSC 430	Counterpoint	
MUSC 431	Contemporary Harmonic Techniques	
MUSC 434	Analytical Techniques	
Applied Music: Select 22 credits from the following:		**22**
MUSC 165	Applied Piano	
MUSC 173	Supplementary Applied Study	
MUSC 265	Applied Piano	
MUSC 273	Supplementary Applied Study	
MUSC 365	Applied Piano	
MUSC 373	Supplementary Applied Study	
MUSC 465	Applied Piano	
MUSC 473	Supplementary Applied Study	
Piano Track		
MUSC 443	Keyboard Literature (Take two times.)	6
Additional Literature: Select one of the following:		2
MUSC 344	Wind Band Literature	
MUSC 346	Survey/Vocal Literature	
MUSC 441	Symphonic Literature	
MUSC 442	Opera Literature	
Pedagogy:		
MUSC 423	Piano Pedagogy (Take two times.)	6
Major Ensembles: Select 2 credits from the following:		2
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 303	Wind Symphony	
MUSC 304	University Symphony Orchestra	
MUSC 306	Concert Choir	
Minor Ensembles: Select 6 credits from the following:		6
MUSC 311	Jazz Ensemble	
MUSC 318	Mixed Chamber Ensemble	
MUSC 321	Piano Chamber Music	
MUSC 322	Jazz Combo	
Select 3 credits from the following:		3
MUSC 319	Opera Workshop	
MUSC 321	Piano Chamber Music	
MUSC 494	Individual Study	
MUSC 166	Applied Composition	
Total Credits		**89**

1

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Degree Notes

- Music majors may not declare a music minor.

Major Requirements

Major: Music - Vocal Performance

Degree Type: B.Mus
Minimum Degree Credits to Graduate: 142

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

A grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements		
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success [1]	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 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 & MUSC 173	Applied Voice and Supplementary Applied Study *	
MUSC 267 & MUSC 273	Applied Voice and Supplementary Applied Study *	
MUSC 367 & MUSC 373	Applied Voice and Supplementary Applied Study *	
MUSC 467 & MUSC 473	Applied Voice and Supplementary Applied Study *	
Vocal Track		
MUSC 174	Pronunciation for Singers I	1
MUSC 175	Pronunciation for Singers II	1
MUSC 346	Survey/Vocal Literature	2
MUSC 349	Vocal Methods & Pedagogy I	2
MUSC 442	Opera Literature	2
Language		
FREN 101	First-Year French I	4
FREN 102	First-Year French II	4
GERM 101	First-Year German I	4
GERM 102	First-Year German II	4
Applied Piano: Private (MUSC 165) or class (MUSC 160; MUSC 161; MUSC 260; MUSC 261)		4
MUSC 160	Piano Class I (Up to 2 semesters of MUSC 165 with permission)	
or MUSC 165	Applied Piano	
MUSC 161	Piano Class II	
MUSC 260	Piano Class III	
MUSC 261	Piano Class IV	
Major Ensemble: Select 8 credits from the following:		8
MUSC 306	Concert Choir (or as approved by adviser)	
Minor Ensemble: Select 4 credits from the following:		4
MUSC 215	University Chamber Singers	
MUSC 317	Madrigal Singers	

MUSC 319	Opera Workshop	
Or as approved by adviser		
Total Credits		**99**

[1]

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

[2]

Students may take THEA 268 instead of 3 credits of Supplementary Applied Study.

Degree Notes

- Music majors may not declare a music minor.

Major Requirements

Major: Music - Composition

Degree Type: B.Mus
Minimum Degree Credits to Graduate: 123

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Code	Title	Credits
Music Core Requirements		
MUSC 103	Introduction to Music History	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success [1]	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 385	Music Entrepreneurship	3
MUSC 480	Recital	1
MUSC 494	Individual Study	1
Applied Music - Select 6 credits from one of the following applied music disciplines:		**6**
Applied Piano		
MUSC 165	Applied Piano	
MUSC 265	Applied Piano	
MUSC 365	Applied Piano	
MUSC 465	Applied Piano	
Applied Voice		
MUSC 167	Applied Voice	
MUSC 267	Applied Voice	
MUSC 367	Applied Voice	
MUSC 467	Applied Voice	
Applied Wind Instruments		
MUSC 168	Applied Wind Instruments	
MUSC 268	Applied Wind Instruments	
MUSC 368	Applied Wind Instruments	
MUSC 468	Applied Wind Instruments	
Applied Percussion Instruments		
MUSC 169	Applied Percussion Instruments	
MUSC 269	Applied Percussion Instruments	
MUSC 369	Applied Percussion Instruments	
MUSC 469	Applied Percussion Instruments	
Applied Upper Strings		
MUSC 170	Applied Upper Strings	
MUSC 270	Applied Upper Strings	
MUSC 370	Applied Upper Strings	
MUSC 470	Applied Upper Strings	
Applied Lower Strings		
MUSC 171	Applied Lower Strings	
MUSC 271	Applied Lower Strings	
MUSC 371	Applied Lower Strings	
MUSC 471	Applied Lower Strings	
Applied Guitar		
MUSC 172	Applied Guitar	
MUSC 272	Applied Guitar	
MUSC 372	Applied Guitar	

MUSC 472	Applied Guitar	
Major Ensembles - Select 6 credits from the following:		**6**
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 215	University Chamber Singers	
MUSC 303	Wind Symphony	
MUSC 304	University Symphony Orchestra	
MUSC 306	Concert Choir	
Minor Ensembles - Select 4 credits from the following:		**4**
MUSC 312	Percussion Ensemble	
MUSC 314	Brass Chamber Ensemble	
MUSC 315	Woodwind Chamber Ensemble	
MUSC 316	String Chamber Ensemble	
MUSC 317	Madrigal Singers	
MUSC 318	Mixed Chamber Ensemble	
MUSC 320	Vocal Chamber Ensemble	
MUSC 321	Piano Chamber Music	
MUSC 322	Jazz Combo	
Piano Classes		
MUSC 160	Piano Class I	1
MUSC 161	Piano Class II	1
MUSC 260	Piano Class III	1
MUSC 261	Piano Class IV	1
Composition Core		
MUSC 331	Instrumental Arranging	2
MUSC 351	Instrumental Conducting & Literature	2
or MUSC 352	Choral Conducting & Literature	
MUSC 430	Counterpoint	3
Applied Composition - Select 13 credits from the following (one semester of 100 level, 2 semesters each of 200 level, 300 level, and 400 level)		
MUSC 166	Applied Composition	1
MUSC 266	Applied Composition (Enroll two times but in different semesters)	2
MUSC 273	Supplementary Applied Study (Enroll two times but in different semesters)	2
MUSC 366	Applied Composition (Enroll two times but in different semesters)	2
MUSC 373	Supplementary Applied Study (Enroll two times but in different semesters)	2
MUSC 466	Applied Composition (Enroll two times but in different semesters)	2
MUSC 473	Supplementary Applied Study (Enroll two times but in different semesters)	2
Upper Division Theory - Select from the following:		**3**
MUSC 411	Form and Analysis	
MUSC 431	Contemporary Harmonic Techniques	
MUSC 434	Analytical Techniques	
Major electives determined in consultation with Advisor		**10**
(Substitution form with course selections must be submitted to the Office of Registration and Records to receive credit for the electives.)		
Total Credits		**84**

[1]

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Minor Requirements

Minor: Music

Required Credits: 20

Code	Title	Credits
Required Courses		
MUSC 103	Introduction to Music History	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
Applied Study Electives		**2**
Major Ensemble Electives		**2**
Electives		**5**
Total Credits		**20**

Minor Requirements and Notes

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

Music Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/performingarts/music/ (http://www.ndsu.edu/performingarts/music/)
- **Credential Offered:**
  B.Mus.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/music-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/music-education/)

The **Bachelor of Music in Music Education** (B.Mus.) includes licensure requirements for teacher candidates to teach music in North Dakota's public schools. Teacher candidates will be certified to teach K-12 after completing all requirements from the music education curriculum. Though the degree contains comprehensive preparation, students generally elect a principal area in either instrumental or voice/choral.

Licensure in Music Education

Teacher candidates must complete the School of Education (https://www.ndsu.edu/education/) requirements, complete the common core music requirements, complete either the vocal or instrumental emphasis and pass a piano proficiency examination prior to student teaching. Piano credit requirements may be waived in whole or in part upon successful completion of the piano proficiency examinations. Specific general education requirements, School of Education requirements, and other information may be obtained from the Division of Performing Arts (https://www.ndsu.edu/performingarts/) office.

Ensembles

The NDSU Challey School of Music sponsors a large variety of ensembles including the NDSU Wind Symphony, Concert Choir, University Symphony Orchestra, Madrigal Singers, two large Jazz Ensembles, Jazz Combos, the Gold Star Marching Band, Brass Ensemble, University Chamber Singers, NDSU Statesmen, Cantemus, University Band, Bison Pep Bands, NDSU Opera Theatre, and chamber ensembles in typical instrumental and vocal combinations. The Concert Choir, Wind Symphony, Jazz Ensemble, Madrigal Singers and several other groups have touring programs, some of which are national or international in scope. Participation in these ensembles is open to all students, some by audition and some as open-enrollment ensembles.

Music Curricula

Requirements are grouped by degree. Please refer also to graduation requirements listed in the Academic Policies (p. 28) section of this publication. The information in this Bulletin may be superseded by information updated regularly and provided by the Challey School of Music.

Sample Program Guide

instrumental music education

8 Semester Plan of Study for Students entering in EVEN Fall.

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
EVEN YEAR		ODD YEAR	
MUSC 111	1	MUSC 103(Gen Ed category A)	3
MUSC 130	3	MUSC 131	3
MUSC 132	1	MUSC 133	1
MUSC 160	1	MUSC 161	1
MUSC 189[1]	1	MUSC XXX Band	1
MUSC 1XX Applied Study	1	MUSC 1XX Applied Study	1
MUSC XXX ChoirMUSC 116, 117 or 215	1	MUSC XXX ChoirMUSC 116, 117 or 215	1
ENGL 110	3	ENGL 120	3
COMM 110	3	Gen Ed Science & Technology w/Lab	4
PSYC 111	3		
	18		**18**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
ODD YEAR		EVEN YEAR	
MUSC 111	1	MUSC 108(Cultural Diversity Gen Ed)	3
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1
MUSC 2XX Applied Study	1	MUSC 2XX Applied Study	1
MUSC 355	2	MUSC XXX Band	1
EDUC 321	3	MUSC 359	2
HDFS 230 or PSYC 250	3	EDUC 322	3
Gen Ed Quantitative Reasoning	3	Gen Ed Science & Technology	3
	18		**18**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
EVEN YEAR		ODD YEAR	
MUSC 331	2	MUSC 341	3
MUSC 340(Gen Ed category A)	3	MUSC 351	2
MUSC 353	2	MUSC 354	2
MUSC 357	1	MUSC 3XX Applied Study	1
MUSC 358	1	MUSC XXX Band	1
MUSC 3XX Applied Study	1	Minor Ensemble	1
MUSC XXX Band	1	MUSC 385	3

EDUC 451	3	MUSC 483	2
EDUC 489	3	EDUC 486	3
Gen Ed Wellness	2		
	19		**18**

Fourth Year

Fall	Credits	Spring	Credits
ODD YEAR		EVEN YEAR	
MUSC 349	2	EDUC 485	1
MUSC 352	2	EDUC 487	9
MUSC 380 or 480	1	EDUC 488	3
MUSC 481	2		
MUSC 482	2		
MUSC 4XX Applied Study	1		
MUSC 3XX Band	1		
MUSC XXX Minor Ensemble	1		
ENGL 322	3		
Gen Ed Science & Technology/Glob Persp	3		
	18		**13**

Total Credits: 140

1

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9 Semester Plan of Study for Students entering in ODD Fall.

First Year

Fall	Credits	Spring	Credits
ODD YEAR		EVEN YEAR	
MUSC 111	1	MUSC 103 (Gen Ed category A)	3
MUSC 130	3	MUSC 131	3
MUSC 132	1	MUSC 133	1
MUSC 160	1	MUSC 161	1
MUSC 189[1]	1	MUSC 1XX Applied Study	1
MUSC 1XX Applied Study	1	MUSC XXX Band	1
MUSC XXX Choir MUSC 116, 117 or 215	1	MUSC XXX Choir MUSC 116, 117 or 215	1
ENGL 110	3	ENGL 120	3
COMM 110	3	Gen Ed Science & Technology w/Lab	4
PSYC 111	3		
	18		**18**

Second Year

Fall	Credits	Spring	Credits
MUSC 111	1	MUSC 108	3
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1

MUSC 355	2	MUSC 2XX Applied Study	1
MUSC 2XX Applied Study	1	MUSC XXX Band	1
HDFS 230 or PSYC 250	3	MUSC 359	2
EDUC 321	3	EDUC 322	3
Gen Ed Science & Technology	3	Gen Ed Science & Technology/Glob Persp	3
	18		**18**

Third Year

Fall	Credits	Spring	Credits
ODD YEAR		EVEN YEAR	
MUSC 340(Gen Ed category A)	3	MUSC 341	3
MUSC 349	2	MUSC 351	2
MUSC 353	2	MUSC 354	2
MUSC 3XX Applied Study	1	MUSC 385	3
MUSC XXX Band	1	MUSC 483	2
MUSC XXX Minor Ensemble	1	MUSC 3XX Applied Study	1
EDUC 451	3	MUSC XXX Band	1
EDUC 489	3	MUSC XXX Minor Ensemble	1
Gen Ed Wellness	2	EDUC 486	3
	18		**18**

Fourth Year

Fall	Credits	Spring	Credits
ODD YEAR		EVEN YEAR	
MUSC 331	2	EDUC 485	1
MUSC 352	2	EDUC 487	9
MUSC 357	1	EDUC 488	3
MUSC 358	1		
MUSC 380 or 480	1		
MUSC 481	2		
MUSC 482	2		
MUSC 4XX Applied Study	1		
MUSC XXX Band	1		
ENGL 322	3		
Gen Ed Quantitative Reasoning	3		
	19		**13**

Total Credits: 140

1

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Sample Program Guide

vocal music education

8 Semester Plan of Study for Students entering in ODD Fall.

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but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ODD YEAR		EVEN YEAR	
MUSC 130	3	MUSC 103	3
MUSC 132	1	MUSC 131	3
MUSC 160	1	MUSC 133	1
MUSC 167	1	MUSC 161	1
MUSC 174	1	MUSC 167	1
MUSC 189[1]	1	MUSC 175	1
MUSC XXX Choir	1	MUSC XXX Choir	1
ENGL 110	3	ENGL 120	3
COMM 110	3	PSYC 111	3
Gen Ed Quantitative Reasoning	3		
	18		**17**
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
EVEN YEAR		ODD YEAR	
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1
MUSC 267	1	MUSC 267	1
MUSC 355	2	MUSC 359	2
MUSC XXX Choir	1	MUSC XXX Choir	1
MUSC XXX Band	1	MUSC XXX Band	1
EDUC 321	3	EDUC 322	3
Gen Ed Science & Technology w/Lab	4	PSYC 250 or HDFS 230	3
		Gen Ed Wellness	2
	17		**18**
Junior			
Fall	**Credits**	**Spring**	**Credits**
ODD YEAR		EVEN YEAR	
MUSC 108(Cultural Diversity Gen Ed)	3	MUSC 341	3
MUSC 340(Gen Ed category A)	3	MUSC 351	2
MUSC 349	2	MUSC 367	1
MUSC 353	2	MUSC 385	3
MUSC 367	1	MUSC XXX Choir	1
MUSC XXX Choir	1	MUSC XXX Minor Ensemble	1
MUSC XXX Minor Ensemble	1	MUSC 483	2
EDUC 451	3	EDUC 486	3
Gen Ed Science & Technology/Glob Persp	3		
	19		**16**

Senior			
Fall	**Credits**	**Spring**	**Credits**
EVEN YEAR		ODD YEAR	
MUSC 352	2	EDUC 485	1
MUSC 467	1	EDUC 487	9
MUSC 380 or 480	1	EDUC 488	3
MUSC 481	2		
MUSC 482	2		
MUSC XXX Choir	1		
EDUC 489	3		
ENGL 322	3		
Gen Ed Science & Technology	3		
	18		**13**

Total Credits: 136

1

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9 Semester Plan of Study for Students entering in EVEN Fall.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
EVEN YEAR		ODD YEAR	
MUSC 130	3	MUSC 103	3
MUSC 132	1	MUSC 131	3
MUSC 160	1	MUSC 133	1
MUSC 167	1	MUSC 161	1
MUSC 174	1	MUSC 167	1
MUSC 189[1]	1	MUSC 175	1
MUSC XXX Choir	1	MUSC XXX Choir	1
ENGL 110	3	ENGL 120	3
COMM 110	3	PSYC 111	3
Gen Ed Quantitative Reasoning	3		
	18		**17**

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ODD YEAR		EVEN YEAR	
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1
MUSC 267	1	MUSC 267	1
MUSC 355	2	MUSC 359	2
MUSC XXX Choir	1	MUSC XXX Choir	1
MUSC XXX Band	1	MUSC XXX Band	1
EDUC 321	3	EDUC 322	3
Gen Ed Science & Technology w/Lab	4	HDFS 230 or PSYC 250	3

		Gen Ed Wellness	2
	17		**18**

Junior			
Fall	**Credits**	**Spring**	**Credits**
EVEN YEAR		ODD YEAR	
MUSC 340(Gen Ed category A)	3	MUSC 341	3
MUSC 353	2	MUSC 351	2
MUSC 367	1	MUSC 367	1
MUSC XXX Choir	1	MUSC 385	3
MUSC XXX Minor ensemble	1	MUSC XXX Choir	1
EDUC 451	3	MUSC XXX Minor Ensemble	1
EDUC 489	3	MUSC 483	2
Gen Ed ence & Technology/Glob Persp	3	EDUC 486	3
		ENGL 322	3
	17		**19**

Senior			
Fall	**Credits**	**Spring**	**Credits**
ODD YEAR		EVEN YEAR	
MUSC 108(Cultural Diversity Gen Ed)	3	EDUC 485	1
MUSC 349	2	EDUC 487	9
MUSC 352	2	EDUC 488	3
MUSC 380 or 480	1		
MUSC 467	1		
MUSC 481	2		
MUSC 482	2		
MUSC XXX Choir	1		
Gen Ed Science & Technology	3		
	17		**13**

Total Credits: 136

1

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Music Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/performingarts/music/ (http://www.ndsu.edu/performingarts/music/)
- **Credential Offered:**
  B.Mus.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/music-education/ (http://catalog.ndsu.edu/programs-study/undergraduate/music-education/)

Major Requirements

Major: Music Education - Instrumental Music Track

Degree Type: B.Mus

Minimum Degree Credits to Graduate: 143

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Music Core Requirements for Education Majors		
PSYC 111	Introduction to Psychology	3
HDFS 230	Life Span Development	3
or PSYC 250	Developmental Psychology	
MUSC 103	Introduction to Music History	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success [1]	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 331	Instrumental Arranging	2
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 349	Vocal Methods & Pedagogy I	2
MUSC 351	Instrumental Conducting & Literature	2
MUSC 352	Choral Conducting & Literature	2
MUSC 353	Woodwind Methods I	2
MUSC 354	Woodwind Methods II	2
MUSC 355	Brass Methods	2
MUSC 357	Marching Band Methods and Techniques	1
MUSC 358	Jazz Methods	1
MUSC 359	Percussion Methods	2
MUSC 380	Recital	1
or MUSC 480	Recital	
MUSC 385	Music Entrepreneurship	3
MUSC 481	Instrumental Music Methods	2
MUSC 482	Choral Music Methods	2
MUSC 483	Elementary Music Methods	2
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Instrumental Track Requirements		
Major Instrumental Ensemble: Must enroll in MUSC 303 Wind Symphony for 5 semesters and MUSC 111 Marching Band for 2 semesters.		7
MUSC 303	Wind Symphony	
MUSC 304	University Symphony Orchestra (for string majors)	
MUSC 111	Marching Band	
Minor Ensembles: Must enroll in 2 different semesters as approved by adviser. May be selected from the following ensembles:		2
MUSC 112	University Band	
MUSC 311	Jazz Ensemble	
MUSC 314	Brass Chamber Ensemble	
MUSC 315	Woodwind Chamber Ensemble	
MUSC 316	String Chamber Ensemble	
MUSC 318	Mixed Chamber Ensemble	
MUSC 322	Jazz Combo	
Major Choral Ensemble (Must enroll for 2 different semesters as approved by adviser):		2
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 215	University Chamber Singers	
Applied Voice:		
MUSC 165	Applied Piano	
Applied Major Instrument: All students enrolled in applied instruction must participate in a major ensemble specific to their area. Two semesters each of 100 level, 200 level, and 300 level. One semester of 400 level. Select from the following:		7
MUSC 168	Applied Wind Instruments	
MUSC 169	Applied Percussion Instruments	
MUSC 170	Applied Upper Strings	
MUSC 171	Applied Lower Strings	

MUSC 172	Applied Guitar	
Applied Piano: Private (MUSC 165) or class (MUSC 160; MUSC 161; MUSC 260; MUSC 261)		4
MUSC 165	Applied Piano (up to 2 semesters with permission)	
MUSC 160	Piano Class I	
MUSC 161	Piano Class II	
MUSC 260	Piano Class III	
MUSC 261	Piano Class IV	
Total Credits		**110**

[1]

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

Proficiency Waiver

- Piano proficiency exam must be completed before student teaching.
- Piano credit requirements listed may be waived in whole or in part for successful completion of the piano proficiency.
- Piano majors may fulfill this requirement by accompanying or performance on a secondary medium according to the discretion of the student's applied instructor/adviser.

Degree Requirements and Notes

- Music majors may not declare a music minor.
- A grade of 'C' or better is required in all MUSC and EDUC prefix courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.
- See School of Education (https://www.ndsu.edu/education/) for admission requirements.

Major Requirements

Major: Music Education - Vocal Music Track

Degree Type: B.Mus
Minimum Degree Credits to Graduate: 151

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Category R: Quantitative Reasoning [†]		**3**

Category S: Science and Technology †	**10**
Category A: Humanities and Fine Arts †	**6**
Category B: Social and Behavioral Sciences †	**6**
Category W: Wellness †	**2**
Category D: Cultural Diversity *†	
Category G: Global Perspectives *†	
Total Credits	**39**

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Music Core Requirements for Education Majors		
PSYC 111	Introduction to Psychology	3
HDFS 230	Life Span Development	3
or PSYC 250	Developmental Psychology	
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 174	Pronunciation for Singers I	1
MUSC 175	Pronunciation for Singers II	1
MUSC 189	Skills for Academic Success [1]	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 340	Music History I	3
MUSC 341	Music History II	3
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 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		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9

EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Vocal Track Requirements		
Major Choral Ensemble: Must be taken in 7 different semesters. Select from the following in consultation with adviser:		7
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 306	Concert Choir	
Minor Choral/Vocal Ensemble: Must be taken in 2 different semesters. Select two credits from the following in consultation with adviser:		2
MUSC 215	University Chamber Singers	
MUSC 317	Madrigal Singers	
MUSC 319	Opera Workshop	
Major Instrumental Ensemble: Must be taken in 2 different semesters. Select two credits from the following in consultation with adviser:		2
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 303	Wind Symphony	
MUSC 304	University Symphony Orchestra	
MUSC 311	Jazz Ensemble	
Applied Voice: Must enroll in the following as indicated:		7
MUSC 167	Applied Voice (for 2 semesters)	
MUSC 267	Applied Voice (for 2 semesters)	
MUSC 367	Applied Voice (for 2 semesters)	
MUSC 467	Applied Voice (for 1 semester)	
Students enrolled in applied instruction must participate in a major ensemble specific to applied area.		
Applied Piano: Private (MUSC 165) or class (MUSC 160; MUSC 161; MUSC 260; MUSC 261)		4
MUSC 160	Piano Class I (Up to 2 semesters of MUSC 165 with permission)	
or MUSC 165	Applied Piano	
MUSC 161	Piano Class II	
MUSC 260	Piano Class III	
MUSC 261	Piano Class IV	
Total Credits		**106**

[1]

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

Proficiency Waiver

- Piano proficiency exam must be completed before student teaching.
- Piano credit requirements listed may be waived in whole or in part for successful completion of the piano proficiency.
- Piano majors may fulfill this requirement by accompanying or performance on a secondary medium according to the discretion of the student's applied instructor/adviser.

Degree Notes

- Music majors may not declare a music minor.
- A grade of 'C' or better is required in all EDUC and MUSC prefix courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.
- See School of Education (https://www.ndsu.edu/education/) for admission requirements.

Minor Requirements

Minor: Music Education

Required Credits: 19

Code	Title	Credits
Required Courses		
MUSC 103	Introduction to Music History	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
Applied Study Electives		**2**
Major Ensemble Electives		**2**
Music Education Practicum: Select one of the following:		**2**
MUSC 481	Instrumental Music Methods	
MUSC 482	Choral Music Methods	
MUSC 483	Elementary Music Methods	
Music Education Methods: Select one from the following:		**2**
MUSC 349	Vocal Methods & Pedagogy I	
MUSC 353	Woodwind Methods I	
MUSC 355	Brass Methods	
MUSC 359	Percussion Methods	
Total Credits		**19**

Minor Requirements and Notes

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

Minor Requirements

Instrumental Music Education Minor

Required Credits: 23

Code	Title	Credits
MUSC 103	Introduction to Music History	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 351	Instrumental Conducting & Literature	2
Instrumental Enselmble: Select 2 credits from the following:		**2**
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 303	Wind Symphony	
Music Education Methods		
MUSC 353	Woodwind Methods I	2
MUSC 355	Brass Methods	2
MUSC 359	Percussion Methods	2
Music Education Practicum		
MUSC 481	Instrumental Music Methods	2
Total Credits		**23**

Minor Requirements

Minor: Vocal Music Education

Required Credits: 20

Code	Title	Credits
MUSC 103	Introduction to Music History	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 352	Choral Conducting & Literature	2
Choral Ensemble: Select 2 credits from the following:		**2**
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 215	University Chamber Singers	
MUSC 306	Concert Choir	
Music Education Methods		
MUSC 162	Voice Class	1
MUSC 163	Voice Class for Instrumentalists	2
Music Education Practicum		
MUSC 482	Choral Music Methods	2
Total Credits		**20**

Natural Resources Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/snrs/ (http://www.ndsu.edu/snrs/)
- **Credential Offered:**
  B.S., Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/natural-resources-management/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/natural-resources-management/)

With increasing human pressure and a growing need to balance competing demands, we need new and better ways to manage our natural resources. The natural resources management (NRM) undergraduate program gives students flexible and powerful options to pursue their studies. Core courses provide a broad foundation in the biological and physical/earth sciences. Students then choose one of six emphases to further their skills and prepare for a variety of careers.

THE PROGRAM

The NRM undergraduate program is offered by the School of Natural Resource Sciences (SNRS) at North Dakota State University (NDSU). We are an interdisciplinary program that focuses on the science and management of natural resources. The program draws upon courses and resources across SNRS, including Entomology, Natural Resource Management, Range Science, and Soil Science, as well as additional programs and colleges across NDSU.

Students in NRM acquire a broad background in natural resources as well as an in-depth study in an area of interest. This exposure to multiple disciplines helps prepare students to find solutions to complex environmental problems. The undergraduate program curriculum is divided into core classes required of all students and an emphasis selected by the individual student from six areas of interest.

NRM Core – This group of courses provides each student a broad foundation while satisfying NDSU's General Education requirements.

NRM Emphasis –NRM offers six emphasis areas, each with their own combination of course requirements and electives. The emphases allow students to choose courses from a diverse group of approved electives.

- **Entomology -** Entomology is the study of insects and how they interact with people and with the environment. This emphasis area provides a strong scientific foundation with a focus on insects, how they are studied, and their management.
- **Environmental Sustainability, Outreach, and Policy -** Focuses on how to deal with environmental and social changes in a sustainable way. The emphasis area prepares students to work on environmental policy and public outreach combined with strategic thinking to predict sustainable paths on pressing environmental issues.
- **Rangeland Ecology -** Focuses on the broad study of native, non-forested ecosystems that cover more than 50% of the earth's land. These areas are managed as natural ecosystems to provide services that can benefit society. This emphasis area will prepare students by covering a variety of ecological topics including wildlife management, grassland restoration, and fire ecology.

- **Rangeland Livestock Production -** Focuses on the management of rangelands and grasslands for optimum livestock production and environmental benefits for society. Students will cover land management fields, the work of agencies and the private sector, as well as ranching operations.
- **Soil Science -** Soil Science is the study of the soil as a component of natural and man-made systems. It is the key factor in food production and is at the forefront of environmental and natural resource issues such as land use, soil contamination, ground water quality and waste disposal.
- **Water, Habitat, and Environmental Management -** Focuses in an interdisciplinary way on the environmental management of ecosystems. This emphasis area teaches basic and hands-on principles in the management of water, habitat (animals and plants), and the environment as a whole.

THE FACULTY

Our faculty come from across the School of Natural Resource Sciences and are dedicated to providing quality instruction and advising.

CAREER OPPORTUNITIES

NRM graduates are prepared with the skills and knowledge for facing complex problems in natural resources, agriculture, and the environment. Common career options include natural resources jobs with government agencies at the federal, state, or local level; agricultural, conservation and environmental non-profit organizations, extension and outreach positions, and private sector employment, including consulting in addition to preparation for advanced degrees.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 150 & 150L	4	BIOL 151 & 151L	4
ENGL 110	3	ENGL 120	3
NRM 150	1	MATH 103	3
NRM 225	3	Gen Ed Hum/FA	3
RNG 136	3	Gen Ed Wellness	2
	14		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CHEM 121 & 121L	4	EMGT, POLS, or SOC Elective	3
COMM 110	3	STAT 330	3
ECON 201	3	ENT 210	3
RNG 213	3	Emphasis Core or Elective Credits	6
SOIL 210	3		
	16		**15**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 321, 324, or 459	3	NRM 421	3
PHIL 215 or 225	3	RNG 452 or GEOG 455	3
3XX/4XX Emphasis Core or Elective Credits	3	4XX/3XX Emphasis Core or Elective Credits	3
Emphasis Core or Elective Credits (Any level)	6	Emphasis Core or Electives (Any level)	6
	15		**15**

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
3XX/4XX Emphasis Core or Elective Credits	9	NRM 462, RNG 462, or SOIL 462	3
Emphasis Core or Elective Credits (Any level)	6	4XX/3XX Emphasis Core or Elective Credits	6
		Emphasis Core or Elective Credits (Any level)	6
	15		**15**

Total Credits: 120

Natural Resources Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/snrs/ (http://www.ndsu.edu/snrs/)
- **Credential Offered:**
  B.S.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/natural-resources-management/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/natural-resources-management/#planofstudytext)

Major Requirements

Major: Natural Resources Management

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**
Category A: Humanities and Fine Arts †		**6**
Category B: Social and Behavioral Sciences †		**6**

Category W: Wellness [†]	**2**
Category D: Cultural Diversity [*†]	
Category G: Global Perspectives [*†]	
Total Credits	**39**

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

MAJOR REQUIREMENTS

Code	Title	Credits
Required Core Courses for Natural Resources Management:		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
ENGL 321	Writing in the Technical Professions	3
or ENGL 324	Writing in the Sciences	
or ENGL 459	Researching and Writing Grants and Proposal	
ENT 210	Insects, Humans and the Environment	3
PHIL 215	Contemporary Moral Issues (May satisfy general education category A)	3
or PHIL 225	Environmental Ethics	
MATH 103	College Algebra	3
NRM 150	Natural Resource Management Orientation	1
NRM 225	Natural Resources & Agrosystems	3
NRM 421	Environmental Outreach Methods	3
NRM/RNG/SOIL 462	Natural Resource and Rangeland Planning	3
RNG 136	Introduction to Range Management	3
RNG 213	Rangeland Sampling Techniques	3
RNG 452	Managing Natural and Rangeland Resources using GIS	3
EMGT, POLS, or SOC Elective		3
SOIL 210	Introduction to Soil Science	3
STAT 330	Introductory Statistics	3
Emphasis: Students must select one of the NRM emphasis areas listed below to complete the major requirements.		45-50
Total Credits		**100-105**

NATURAL RESOURCES MANAGEMENT EMPHASIS AREAS

- Declaring an Emphasis- Students should formally declare an emphasis area with the **Office of Registration & Records** no later than the beginning of their junior year. The emphasis area is recorded on the academic transcript with the degree.

Water, Habitat, and Environmental Management Emphasis

Code	Title	Credits
BIOL 364	General Ecology	3
BIOL 475	Conservation Biology	3
or BIOL 476	Wildlife Ecology and Management	
ECON 481	Natural Resource Economics	3
NRM 264	Natural Resource Management Systems	3
NRM 402	River and Stream Resource Management	3

or NRM 454	Wetland Resources Management	
or SOIL 410	Soils and Land Use	
NRM 431	National Environmental Policy Act and Environmental Impact Assessment	3
NRM 453	Rangeland Resources Watershed Management	3
Select a minimum of 29 credits from the approved electives below:		29
BIOL 359	Evolution	
BIOL 414	Plant Systematics	
BIOL 450	Invertebrate Zoology	
BIOL 452	Ichthyology	
BIOL 454	Herpetology	
BIOL 456	Ornithology	
BIOL 458	Mammalogy	
BIOL 460	Animal Physiology	
BIOL 461	Plant Ecology	
BIOL 462	Physiological Ecology	
BIOL 463	Animal Behavior	
BIOL 472	Structure and Diversity of Plants and Fungi	
BIOL 477	Wildlife and Fisheries Management Techniques	
BIOL 480	Ecotoxicology	
BIOL 481	Wetland Science	
ENT 350	General Entomology	
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	
NRM 401	Urban-Ecosystem Management	
NRM 420	Sustainable Scenarios in Natural Resources Management	
PLSC 219	Introduction to Prairie & Community Forestry	
PLSC 315	Genetics	
PLSC 315L	Genetics Laboratory	
PLSC 323	Principles of Weed Science	
PLSC 355	Woody Landscape Plants	
RNG 451	Ecology of Fire-Dependent Ecosystems	
RNG 456	Ecological Restoration	
RNG 458	Grazing Ecology	
RNG 450	Range Plants	
SOIL 217	Introduction to Meteorology & Climatology	
SOIL 351	Soil Ecology	
SOIL 410	Soils and Land Use	
SOIL 433	Soil Ecohydrology and Physics	
SOIL 444	Soil Genesis and Survey	
Total Credits		**50**

Environmental Sustainability, Outreach, and Policy Emphasis

Code	Title	Credits
BIOL 364	General Ecology	3
ECON 481	Natural Resource Economics	3
NRM 401	Urban-Ecosystem Management	3
NRM 420	Sustainable Scenarios in Natural Resources Management	3
NRM 431	National Environmental Policy Act and Environmental Impact Assessment	3
POLS, SOC or EMGT	200 level or higher	6
Select a minimum of 29 credits from the approved electives listed below:		29
BIOL 461	Plant Ecology	
COMM 112	Understanding Media and Social Change	

COMM 133	Introduction to Agricultural Communication
COMM 316	Conflict Communication
ECON 482	Environmental Economics
EMGT 101	
EMGT 281	
EMGT 361	
EMGT 362	
EMGT 363	
EMGT 410	
ENT 350	General Entomology
GEOL 201	Climate Change and Energy
GEOL 219	Oceanography
GEOL 300	Environmental Geology
GEOL 412	Geomorphology
GEOL 414	Hydrogeology
GEOL 460	Biogeochemistry
GEOG 470	Remote Sensing
NRM 322	Environmental Law and Policy
NRM 453	Rangeland Resources Watershed Management
PLSC 110	World Food Crops
PLSC 219	Introduction to Prairie & Community Forestry
POLS 115	American Government
POLS 215	Problems and Policies In American Government
POLS 442	Global Policy Issues
RNG 451	Ecology of Fire-Dependent Ecosystems
RNG 456	Ecological Restoration
RNG 458	Grazing Ecology
SOC 110	Introduction to Sociology
SOC 115	Social Problems
SOC 340	Social Research Methods
SOC 404	Community Assessment
SOC 405	Community Development
SOC 235	Cultural Diversity
SOC 431	Environmental Sociology
SOC 439	Social Change
SOIL 217	Introduction to Meteorology & Climatology
AGEC 347	Principles of Real Estate
AGEC 242	Introduction to Agricultural Management
AGEC 375	Applied Agricultural Law
AGEC 452	Food Laws & Regulations
AGEC 474	Cooperatives
MATH 144	Mathematics for Business
ECON 202	Principles of Macroeconomics
ECON 341	Intermediate Microeconomics
ECON 470	Public Economics
GEOL 465	Remote Sensing of the Environment
Total Credits	**50**

Rangeland Ecology Emphasis

Code	Title	Credits
ANSC 114	Introduction to Animal Sciences	3
BIOL 364	General Ecology	3

BIOL 452	Ichthyology	3
or BIOL 454	Herpetology	
or BIOL 456	Ornithology	
or BIOL 458	Mammalogy	
BIOL 461	Plant Ecology	3
BIOL 475	Conservation Biology	3
or BIOL 476	Wildlife Ecology and Management	
NRM 431	National Environmental Policy Act and Environmental Impact Assessment	3
NRM 453	Rangeland Resources Watershed Management	3
or NRM 454	Wetland Resources Management	
PLSC 380	Principles of Plant Physiology	3
RNG 450	Range Plants	3
RNG 451	Ecology of Fire-Dependent Ecosystems	3
RNG 456	Ecological Restoration	3
RNG 458	Grazing Ecology	3
SOIL 217	Introduction to Meteorology & Climatology	3
SOIL 351	Soil Ecology	3
or SOIL 410	Soils and Land Use	
or SOIL 444	Soil Genesis and Survey	
Select a minimum of 9 additional credits of 300 or 400 level courses from ENT, SOIL, RNG, or NRM:		9
Total Credits		**51**

Rangeland Livestock Production Emphasis

Code	Title	Credits
ANSC 114	Introduction to Animal Sciences	3
ANSC 220	Livestock Production	3
ANSC 223	Introduction to Animal Nutrition	2
ANSC 357	Animal Genetics	3
NRM 431	National Environmental Policy Act and Environmental Impact Assessment	3
PLSC 315	Genetics	3
PLSC 320	Integrated Forage and Cover Crops Production Management and Ecosystem Services	3
PLSC 323	Principles of Weed Science	3
RNG 450	Range Plants	3
RNG 456	Ecological Restoration	3
RNG 458	Grazing Ecology	3
SOIL 217	Introduction to Meteorology & Climatology	3
SOIL 351	Soil Ecology	3
or SOIL 410	Soils and Land Use	
or SOIL 444	Soil Genesis and Survey	
Select a minimum of 9 additional credits of 300 or 400 level courses from ENT, SOIL, RNG, or NRM		9
Total Credits		**47**

Soil Science Emphasis

Code	Title	Credits
CHEM 240	Survey of Organic Chemistry	3
or BIOC 260	Elements of Biochemistry	
or MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
MATH 105	Trigonometry	3
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4

PLSC 110	World Food Crops	3
PLSC 225	Principles of Crop Production (or 300/400 level Range Sciences Course)	3
PLSC 380	Principles of Plant Physiology	3
SOIL 217	Introduction to Meteorology & Climatology	3
SOIL 322	Soil Fertility and Fertilizers	3
SOIL 351	Soil Ecology	3
SOIL 410	Soils and Land Use	3
SOIL 433	Soil Ecohydrology and Physics	3
SOIL 444	Soil Genesis and Survey	3
SOIL/NRM 454	Wetland Resources Management	3
Select a minimum of 6 additional credits of 300 or 400 level classes from PLSC, RNG, NRM, ENT, PPTH, ABEN, or ASM		6
Total Credits		**50**

Entomology Emphasis

Code	Title	Credits
BIOL 364	General Ecology	3
RNG 450	Range Plants	3
or BIOL 461	Plant Ecology	
or PLSC 380	Principles of Plant Physiology	
BIOL 450	Invertebrate Zoology	3
BIOL 475	Conservation Biology	3
ENT 350	General Entomology	3
ENT 431	Principles of Insect Pest Management	3
ENT 470	Insect Ecology	3
PLSC 110	World Food Crops	3
Select a minimum of 6 credits of approved electives from below:		6
PLSC 210	Horticulture Science	
PLSC 219	Introduction to Prairie & Community Forestry	
PLSC 315	Genetics	
PLSC 323	Principles of Weed Science	
PLSC 350	Sugarbeet Production	
PLSC 355	Woody Landscape Plants	
PLSC 365	Herbaceous Landscape Plants	
PLSC 370	Landscape Management	
PLSC 375	Turfgrass Management	
PLSC 412	Nursery Production and Management	
PLSC 415	Vegetable Crop Production	
PLSC 416	Fruit Crop Production	
PLSC 422	Greenhouse Production and Management	
PLSC 425	Potato Science	
PLSC 431	Intermediate Genetics	
PLSC 433	Weed Biology and Ecology	
PLSC 455	Cropping Systems:An Integrated Approach	
SOIL 351	Soil Ecology	
Select a minimum of 15 credits from the approved electives listed below:		15
BIOL 359	Evolution	
BIOL 463	Animal Behavior	
BIOL 476	Wildlife Ecology and Management	
MICR 202	Introductory Microbiology	
MICR 452	Microbial Ecology	
MICR 463	Clinical Parasitology	
NRM 401	Urban-Ecosystem Management	

NRM 402	River and Stream Resource Management
NRM 420	Sustainable Scenarios in Natural Resources Management
NRM 431	National Environmental Policy Act and Environmental Impact Assessment
NRM 453	Rangeland Resources Watershed Management
NRM 454	Wetland Resources Management
PLSC 315	Genetics
PPTH 324	Introductory Plant Pathology
PPTH 454	Diseases Of Field and Forage Crops
PPTH 455	Plant Disease Management
PPTH 457	Landscape Plant Pathology
PPTH 460	Fungal Biology
RNG 450	Range Plants
SOIL 410	Soils and Land Use
Total Credits	**45**

Accelerated Program in Natural resource Management

Code	Title	Credits
NRM 621	Environmental Outreach Methods	3
NRM 652	Managing Natural and Rangeland Resources using GIS	3
NRM 662	Natural Resource and Rangeland Planning	3
600 Level Electives	NRM/RNG/SOIL/ENT [1]	6
Total Credits		15

1

Accelerated Electives must be advisor approved and the specific courses are to be identified on the Accelerated Declaration form.

Degree Requirements and Notes:

- **Acceptable Substitutions**: For the Water, Habitat, and Environmental Management; Environmental Sustainability, Outreach, and Policy; and Entomology emphasis areas there is a list of recommended emphasis electives: All other substitutions require advisor approval and a substitution form to be completed and submitted to the Office of Registration and Records (https://www.ndsu.edu/registrar/). Emphasis area courses may not be double-counted with the NRM core classes; a maximum of 3 credits of Field Experience (396/496) or Co-op Ed (397/497) may be counted as emphasis electives.
- **Accelerated Program in NRM Notes:**
  - If a student is interested in this option, they should speak with their Undergraduate Advisor. Students intending to pursue the Accelerated option will need a 3.0 overall GPA, as well as 60 completed credits (in-progress courses do not count). Students will be required to complete a ***Combined/Accelerated Program Declaration Form*** and apply to the Graduate School. Taking the GRE is not required.

Minor Requirements

Minor: Natural Resources Management

Required Credits: 18

Code	Title	Credits
Core Course		
NRM 225	Natural Resources & Agrosystems	3
Interdisciplinary Courses: Select 5 of the following:		15
BIOL 364	General Ecology	
BIOL 476	Wildlife Ecology and Management	
ECON 481	Natural Resource Economics	
EMGT 261		
EMGT 262		
ENT 350	General Entomology	
GEOL 105	Physical Geology	
GEOL 300	Environmental Geology	
HIST 434	Environmental History	

HIST 435	World Environmental History
NRM 264	Natural Resource Management Systems
NRM 401	Urban-Ecosystem Management
NRM 402	River and Stream Resource Management
NRM 420	Sustainable Scenarios in Natural Resources Management
NRM 421	Environmental Outreach Methods
NRM 431	National Environmental Policy Act and Environmental Impact Assessment
NRM/RNG 453	Rangeland Resources Watershed Management
NRM 454	Wetland Resources Management
NRM 456	Ecological Restoration
RNG 136	Introduction to Range Management
RNG 450	Range Plants
RNG 451	Ecology of Fire-Dependent Ecosystems
RNG 458	Grazing Ecology
SOC 405	Community Development
SOC 431	Environmental Sociology
SOIL 210	Introduction to Soil Science
SOIL 351	Soil Ecology
SOIL 410	Soils and Land Use
SOIL 433	Soil Ecohydrology and Physics
Total Credits	**18**

Minor Requirements and Notes:

- Students must earn a 2.00 minimum GPA in the courses used to satisfy the minor requirements.
- A minimum of 8 credits must be taken at NDSU.

Neuroscience

Department Information

- **Department Web Site:**
  www.ndsu.edu/psychology/ (http://www.ndsu.edu/psychology/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/neuroscience/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/neuroscience/)

Neuroscience is a rapidly expanding field and an undergraduate minor will benefit students studying in many scientific disciplines (e.g., biology; zoology; psychology; chemistry), pre-professional and professional areas (e.g., exercise science; nursing; pharmacy), as well as in the humanities and social sciences. Students learn how the brain and nervous system receives and processes information to generate and guide a variety of conscious and unconscious behaviors. Moreover, with an inherent emphasis on critical thinking, a neuroscience minor provides a valuable basis for thinking about the human condition in terms of measurable data. The neuroscience minor may increase students' opportunities to attend graduate school or to find positions in their professional field.

Courses taken for a Psychology major cannot be used toward a Neuroscience minor. Be sure to officially declare your minor with the Office of Registration and Records (https://www.ndsu.edu/registrar/) by completing the Minor/Advisor Change Form (https://www.ndsu.edu/registrar/forms/) which is found online.

Neuroscience

Department Information

- **Department Web Site:**
  www.ndsu.edu/psychology/ (http://www.ndsu.edu/psychology/)
- **Credential Offered:**
  Minor

- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/neuroscience/ (http://catalog.ndsu.edu/programs-study/undergraduate/neuroscience/)

Minor Requirements

Minor: Neuroscience

Required Credits: 17

Code	Title	Credits
Required Courses		
PSYC 260	Introduction to Neuroscience	3
Electives: Select 14 credits from the following:		14
BIOL 220	Human Anatomy and Physiology I	
BIOL 220L	Human Anatomy and Physiology I Laboratory	
PSYC 322	Judgment & Decision-Making	
PSYC 450	Computational Methods in Experimental Psychology	
PSYC 460	Sensation & Perception	
PSYC 461	Memory And Knowledge	
PSYC 464	Attention & Thinking	
PSYC 465	Psychobiology	
PSYC 481	Health Psychology	
PSYC 486	Neuropsychology	
PSYC 493	Undergraduate Research (no more than 6 credits)	
Total Credits		**17**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Psychology Majors: Classes taken for the psychology major cannot be double-counted with the neuroscience minor. The credits must be unique from courses used to fulfill the psychology major.

Nutrition Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/hnes/ (http://www.ndsu.edu/hnes/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/nutrition-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/nutrition-science/)

Background Information

NDSU has a long-standing history in food and nutrition. Since 1925, NDSU has educated nutrition experts who are active nationwide in the profession of nutrition and dietetics and leaders in professional organizations.

Program Information

NDSU offers two tracks for those interested in studying nutrition science. The first is an accredited BS/MS Accelerated Coordinated Program in Nutrition Science and Dietetics (CPD) to become a Registered Dietitian Nutritionist (RDN). An RDN is a nutrition expert and is a nationally recognized credential that is required for most employment in the healthcare industry and preferred for many other employment opportunities in the area of food and nutrition. The BS/MS Accelerated Coordinated Program in Nutrition Science and Dietetics combines the required 1,000 hours of supervised practice with a Bachelor of Science in Nutrition Science and Master of Science in Exercise and Nutrition Science. Students graduate at the end of five years with the necessary preparation to take the Commission on Dietetic Registration exam to become an RDN. Please see the **CPD website** for more information.

The second track is a four-year BS in Nutrition Science. This is a non-accredited program that provides students a background in nutrition but also serves as a pathway for advanced degrees in other health professions such as Pre-Physician Assistant, Athletic Trainer, or Accelerated (Post-

Baccalaureate) BSN to become a licensed Registered Nurse. It also serves as a pathway to become a Certified Dietary Manager (CDM). This degree path allows flexibility in courses to ensure students are able to meet prerequisite course requirements for other degrees they may pursue in the future.

Career Opportunities

Dietitians are employed in facilities such as hospitals, clinics and long-term care, providing nutrition therapy as well as foodservice administration. Dietitians work in various fields including high school, college, and professional sports, in business as sales or educational professionals, for commercial and government establishments, or in community or clinical settings and public health. Some registered dietitian nutritionists work for food commodity groups such as the Dairy Council or Wheat Commission. Dietitians work in education by teaching dietetics, nutrition and foodservice management in colleges, universities, medical schools and public school systems. In community settings, dietitians provide counseling and nutritional services for city and county health departments, older American feeding programs, childcare centers, school foodservice programs, and in retail settings like grocery stores. Dietitians also work in wellness centers, hospitals, and consulting positions as part of the health promotion team.

The practice of dietetics is continuously changing as more research is conducted on foods and on the role of food in human health. Many dietitians work in hospital settings, either in clinical management or nutrition therapy as clinical dietitians. Clinical dietitians who work in nutrition therapy assess the nutritional needs of patients, plan menus, recommend or prescribe diets and nutritional support for patients, consult with physicians and direct educational programs on nutrition and special diets. They are members of the interdisciplinary team both in healthcare and wellness facilities.

Career Outlook

Placement surveys conducted in the Department of Health, Nutrition, and Exercise Sciences at NDSU show that more than 90 percent of graduates from the Coordinated Program in Nutrition Science and Dietetics are employed or enrolled in graduate training within 12 months of graduation. In recent study, it was projected there will be a continued demand for dietitians in both traditional and nontraditional areas for years to come. During college, many opportunities are available for students to obtain experience in the field. Some of these opportunities are offered through healthcare facilities such as acute care hospitals and long-term care facilities, foodservice in a variety of venues, and public health service.

Academic Advisement

The Department of Health, Nutrition, and Exercise Sciences prides itself on giving individual attention and advisement to each student. A faculty advisor is assigned to each nutrition science major. The academic advisor helps students set goals for their college work, helps them choose courses and encourages them to seek community work experience during their college career. In addition to the academic advisor, each incoming freshman and transfer student is assigned a student advisor to help with routine questions and to give assistance in adjusting to college life.

High School Preparation

Students interested in nutrition science should have a background in the natural sciences and mathematics. Strong communication skills, both oral and written, is an advantage to students considering nutrition science.

Scholarships

Numerous scholarships are available through the College of Health and Human Sciences and the Academy of Nutrition and Dietetics. Contact the department for more information or visit: Scholarships | College of Health and Human Sciences | NDSU (https://www.ndsu.edu/healthhumansciences/current_students/scholarships/)

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
CHEM 117		3	PSYC 211	3
PSYC 111		3	MICR 202	2
MATH 103[1]		3	MICR 202L	1
ENGL 110		3	ENGL 120	3
Gen Ed HUM&FA/Glob Persp		3	Gen Ed Hum&FA/Cult Div	3
			Free Elective	3
		15		**15**

Sophomore				
Fall	**Credits**		**Spring**	**Credits**
BIOL 220		3	BIOC 260	4
BIOL 220L		1	BIOL 221	3
HNES 250		3	BIOL 221L	1
HNES 291		1	HNES 251	3
COMM 110		3	HNES 261	3
CSCI 114		3	HNES 261L	2
		14		**16**
Junior				
Fall	**Credits**		**Spring**	**Credits**
HNES 351		4	HNES 260	1
STAT 330		3	HNES 354	4
Gen Ed Upper Division Writing		3	HNES 499 (Interprofessional Healthcare Practice)	1
Minor Requirement[1]		4	Minor Requirement[2]	3
			Free Electives	5
		14		**14**
Senior				
Fall	**Credits**		**Spring**	**Credits**
Minor Requirement[2]		7	Minor Requirement[2]	3
Free Electives		8	Free Electives	14
		15		**17**

Total Credits: 120

1

MATH 103 is a prerequisite for STAT 330. If not needed due to placement scores or transfer, student will need 3 credits of free electives.

2

Students in the standard option must declare and complete a minor program of study form. Minors can be declared with the assistance of an academic advisor. Declaration forms must be officially declared with the Office of Registration and Records.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
CHEM 117		3	PSYC 211	3
PSYC 111		3	MICR 202	2
MATH 103[1]		3	MICR 202L	1
ENGL 110		3	ENGL 120	3
Gen Ed Hum&FA/Glob Persp		3	Gen Ed HUM&FA/Cult Div	3
			Free Elective	3
		15		**15**

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
BIOL 220	3	Applications are due for Coordinated Program in Dietetics.	
BIOL 220L	1	BIOC 260	4
HNES 250	3	BIOL 221	3
HNES 291	1	BIOL 221L	1
COMM 110	3	HNES 251	3
CSCI 114	3	HNES 261	3
Free Electives	3	HNES 261L	2
	17		**16**
Junior			
Fall	**Credits**	**Spring**	**Credits**
HNES 351	4	HNES 354	4
HNES 442	3	HNES 354L	2
STAT 330	3	HNES 361	3
Gen Ed Upper Division Writing	3	HNES 361L	3
Free Electives	3	HNES 260	1
		HNES 499 (Interprofessional Healthcare Practice)	1
		Free Electives	3
	16		**17**
Senior			
Fall	**Credits**	**Spring**	**Credits**
HNES 458L	3	HNES 480	12
HNES 658	4	HNES 726	3
HNES 468L	1	HNES 793, 794, 795, 797, or 798[2,3]	1-2
HNES 668	1		
MGMT 320	3		
HNES 710	3		
	15		**16-17**
Fifth Year			
Fall	**Credits**	**Spring**	**Credits**
HNES 735	3	HNES 777 or 727	3
STAT 725	3	HNES 713	3
HNES 793, 794, 795, 797, or 798[2,3]	1-2	HNES 793, 794, 795, 797, or 798[2,3]	1-2
		Graduate Level Free Elective	1-4
	7-8		**8-12**

Total Credits: 142-148

1

MATH 103 is a pre-requisite for STAT 330. If not needed due to placement scores or transfer, student will need 3 credits of free electives.

2

Plan A students will take HNES 798; Plan B students will take HNES 797; Plan C students will take either HNES 793, HNES 794, or HNES 795.

3

Plan A requires a total of 30 graduate credits including 6 credits of HNES 798 and 6 credits of elective; Plan B requires a total of 30 graduate credits including 3 credits of HNES 797 and 9 credits of elective; Plan C requires a total of 30 graduate credits including 3 credits of HNES 793, HNES 794, or HNES 795 and 9 credits of elective.

Nutrition Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/hnes/ (http://www.ndsu.edu/hnes/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/programs-study/undergraduate/nutrition-science/ (http://catalog.ndsu.edu/programs-study/undergraduate/nutrition-science/)

Degree Requirements

Major: Nutrition Science

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Nutrition Science Core Requirements		
BIOC 260	Elements of Biochemistry	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 117	Chemical Concepts and Applications	3
CSCI 114	Computer Applications	3
HNES 250	Nutrition Science	3
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 Introduction to Nutrition Science Careers	1
HNES 351	Metabolic Basis of Nutrition	4
HNES 354	Introduction to Medical Nutrition Therapy	4
HNES 499	Special Topics (Interprofessional Health Care Practice) [1]	1
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
PSYC 111	Introduction to Psychology	3
PSYC 211	Introduction To Behavior Modification	3
STAT 330	Introductory Statistics	3
Select Standard or Coordinated Program Option		
To complete the major, students must complete either the Standard Option or the Coordinated Program Option. Requirements are outlined below.		16-35
Total Credits		**68-87**

1
Interprofessional Health Care Practice course currently taught as HNES 499; a permanent number will be chosen for 2025-2026 academic year.

Standard Option

Code	Title	Credits
Minor Program of Study		
Students in the standard option must declare and complete a minor program of study. Minors must be declared with the assistance of an academic advisor. Minor forms must be officially submitted to the Office of Registration and Records.		16

Coordinated Program Option

Code	Title	Credits
Coordinated Program Option in Nutrition Science (B.S. to M.S. or M.P.H. accelerated option)		
HNES 354L	Introduction to Medical Nutrition Therapy Laboratory	2
HNES 361	Foodservice Systems Management I	3
HNES 361L	Foodservice Systems Management I Laboratory	3
HNES 442	Community Health and Nutrition Education	3
HNES 658	Advanced Medical Nutrition Therapy	4
HNES 458L	Advanced Medical Nutrition Therapy Laboratory	3
HNES 480	Dietetics Practicum (Capstone Experience)	12
HNES 668	Foodservice Systems Management II	1
HNES 468L	Foodservice Systems Management II Laboratory	1

MGMT 320	Foundations of Management	3
Total Credits		**35**

The following program notes apply to students admitted into the coordinated program and plan to complete the accelerated option.

- Students planning to engage in an accelerated program must complete the Coordinated Program subplan. Students who elect to complete the standard Nutrition Science program are not eligible for an accelerated program.
- A grade of 'C' or better is required for transfer courses in nutrition science.
- A grade of 'C' or better is required in all HNES prefix courses.
- Minimum GPA requirements must be met for acceptance into the program (3.0 overall and 2.75 in sciences including BIOC 260, BIOL 220/L, BIOL 221/L, CHEM 117, HNES 250, and MICR 202/L).
- A grade of 'C' or better is required for all required science courses (BIOC 260, BIOL 220/L, BIOL 221/L, CHEM 117, MICR 202/L).
- A grade of 'B' or better is required for HNES 250 - Nutrition Science.
- Students interested in this option should speak with the Undergraduate Advisor for Nutrition Science in the College of Health and Human Sciences Academic Advising Center located in EML 270.
- Students intending to pursue the Accelerated option must maintain a 3.0 overall GPA.
- Students will also be required to complete a Combined/Accelerated Degree Program Declaration Form during the summer or fall after semester 4 and then apply to the Graduate School during semester 5.
- GRE is not required.

Nursing

Department Information

- **Department Web Site:**
  www.ndsu.edu/nursing/ (http://www.ndsu.edu/nursing/)
- **Credential Offered:**
  B.S.N.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/nursing/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/nursing/)

North Dakota State University offers a Bachelor of Science in Nursing (BSN) degree. The professional program is offered at the NDSU Fargo site and NDSU Nursing at Sanford Health in Bismarck. Graduates are eligible to apply for the national licensing examination (NCLEX) to become a registered nurse (RN). The program is fully accredited by the Commission of Collegiate Nursing Education and approved by the North Dakota Board of Nursing.

The Program

The mission of the School of Nursing is to advance nursing knowledge and develop dynamic nurse leaders who improve the health of all people, emphasizing underserved, rural, and diverse populations. The nursing curriculum prepares professional nurses by providing a sound educational base for practice, graduate study, professional development, and professional and civic responsibility. The nursing program serves as a resource for society through consultation, collaboration, advocacy, and scholarship.

Career Opportunities

Rapid changes in health care and technology require the nursing profession to continually expand its role. Employment forecasts predict an increasing demand for professional nurses. Career opportunities for a nurse with a BSN include positions in hospitals, schools, community agencies, the military, insurance companies, nursing homes, clinics, businesses, and research settings. Graduates are prepared to work in a variety of settings that demand critical thinking, autonomy, collaboration, and accountability. A BSN degree offers an array of career options and opportunities for career advancement.

Extra-Curricular Activities

Numerous active student organizations are available at NDSU, including Student Nurses Association chapters in Bismarck and Fargo. Nursing students are strongly encouraged to participate in campus activities because they provide opportunities for teamwork, leadership, service, and enjoyment.

Scholarships

Information on scholarships for students admitted to the major is available from the Office of Financial Aid and Scholarships and the School of Nursing. Information on first year or transfer student scholarships is available from the Office of Admission.

The Faculty and Facilities

The NDSU BSN program is offered at two locations: the NDSU Fargo site and NDSU Nursing at Sanford Health in Bismarck. At the NDSU Fargo site, students will find faculty offices and state-of-the art, hands-on nursing education labs in the six-story Aldevron Tower. Additional classrooms are found in Sudro Hall, connected to Aldevron Tower. In Bismarck, the School of Nursing is conveniently located across the street from Sanford Medical Center. The School houses faculty offices, classrooms, and fully equipped skills and health assessment labs, as well as an advanced simulation center to enhance student learning. The Fargo-Moorhead and Bismarck communities provide a rich source of health care facilities, which are utilized by the nursing program. The faculty members are experts in specialized clinical practice areas and assist students with learning in the classroom, laboratory, and clinical settings.

Advising

The School of Nursing is part of the College of Health and Human Sciences. Pre-nursing advising is available for all students prior to acceptance into the professional program. Each nursing student admitted to the professional program is assigned a nursing faculty advisor who is available for academic guidance, assistance, and career planning. Students are strongly encouraged to seek the assistance of their advisor early in their plan of study and maintain contact on a regular basis.

Transfer

The pre-professional courses may be completed at NDSU or at another regionally accredited college or university. Transfer students are encouraged to contact a pre-nursing advisor early to discuss course selection and transferability. All of the professional nursing classes are completed in sequence and cannot be accelerated due to clinical placements. The pre-licensure professional program takes three years to complete. The LPN-BSN and RN-BSN program both take two years to complete. The Accelerated (Post-Baccalaureate) is just over fourteen months in length.

Admission to the Pre-Licensure Program

Direct Admission

Direct admission is offered to high school seniors who have demonstrated exemplary academic performance. Direct admission is available at both the Bismarck and Fargo sites. Applications are due December 15. If offered direct admission, students will complete the freshman year prerequisite courses. Students must maintain established progression criteria during their first year of coursework. If program criteria are met, students begin the professional nursing program in their second year. Students not admitted through direct admission, or who do not maintain progression requirements, can apply through the standard admission process. Additional information as well as the admission application can be found at https://www.ndsu.edu/nursing/degrees/pre_licensure_bsn_track/direct_admin/.

Standard Admission

The School of Nursing in Bismarck accepts applications and admits students for both fall and spring semesters. On the Fargo site, applications are accepted once per year for students starting the program in both fall and spring. To be eligible for application, students must meet the following requirements: 1) a minimum cumulative grade point average (GPA) of 2.75* on all college level work, and 2) completion of the prerequisite courses with a grade of "C" or higher. The application deadlines and online application are posted on the School of Nursing website (https://www.ndsu.edu/nursing/degrees/pre_licensure_bsn_track/admission/). Admission is competitive and involves a holistic review process. The holistic review considers a student's life experiences, personal qualities, and attributes, as well as traditional measures such as GPA. Students are encouraged to consult with the pre-nursing advisor at their preferred site prior to the application deadline. **Because of limitations on class size, the typical student admitted to the nursing program has a selective GPA higher than 2.75.*

Selected Prerequisite Courses

The selected GPA is calculated based on grades in the following prerequisite courses. (Applicants may have prerequisite courses in progress at the time of application.)

- Communication 110: Fundamentals of Public Speaking
- English 120: College Composition II
- Psychology 111: Introduction to Psychology
- Sociology 110: Introduction to Sociology *or* Anthropology 111: Introduction to Anthropology

A minimum of 8 credits in the science category (preference will be given to those students who have completed 11 credits or more.)

- Biology 220/220L: Human Anatomy and Physiology I/Lab
- Biology 221/ 221L: Human Anatomy and Physiology II/Lab
- Biochemistry 260: Elements of Biochemistry (An equivalent course is Chem 116: Introduction to Organic and Biochemistry)
- Chemistry 117/117L: Chemistry Concepts and Applications/Lab (An equivalent course is Chem 115/115L: Introductory Chemistry and Lab)
- Microbiology 202/202L: Introductory Microbiology/Lab

Note:

- Students should consult their faculty advisor for electives to enhance their program of study and to meet graduation requirements.
- Computer proficiency is expected before beginning the nursing major.
- Disclaimer: The recommended curriculum is subject to change based on nursing program development. Students must consult with their nursing advisor to facilitate progression in the program.

Advancing to a BSN from an LPN or RN

NDSU offers two tracks for nurses who are licensed as either a licensed practical nurse (LPN) or a registered nurse (RN).

The NDSU School of Nursing offers individual, personalized advising to all students prior to and once accepted in the professional programs. NDSU accepts courses from Regional Accredited Colleges and Universities.

LPN to BSN

The LPN to BSN program is designed for a licensed practical nurse (LPN) seeking to obtain a Bachelor of Science in Nursing. Graduates are then eligible to apply for the National Council Licensure Examination (NCLEX) to become a Registered Nurse (RN). Coursework in the professional program is completed on a part-time basis (approx. 6 nursing credits a semester) over the length of two years (including summers). Courses are delivered online with clinical work completed in a variety of Fargo locations during the summer semesters. The curriculum builds on students' prior knowledge to develop critical thinking, theoretical knowledge, leadership, and growth in the RN professional role.

Admission Requirements for LPN-BSN

1. Completion of the NLN NACE (RN-BSN) Exams are required prior to applying to the professional program.
2. Admission to NDSU (it is recommended the application be submitted by Sept. 1st for spring start). Note: Admission to NDSU is not required to complete the validation exams (NACE exams).
3. Completed Application, which is sent to students after passing the NACE exams. Application deadline: Oct. 15th.
4. Professional Nursing Program Requirements
    a. NLN NACE exams must be completed with passing score prior to applying to the professional program.
    b. Graduate with a Diploma or Certificate in Nursing or an Associate of Applied Science in Nursing.
    c. Cumulative GPA of a 2.75 or greater and a Nursing GPA of 3.0 or greater.
    d. The completion of the following courses with a "C" or higher:
        - Biology 220/2201 & 221/2211: Anatomy and Physiology I and II with lab
        - Microbiology 202/202L: Introduction to Microbiology
        - English 120: College Composition II
        - Communications 110: Fundamentals of Public Speaking
        - Psychology 250: Developmental Psychology
        - Sociology 110: Introduction to Sociology
5. Current unencumbered nursing license as a Licensed Practical Nurse or must be able to obtain license by May and will be admitted on probation pending licensure.

RN TO BSN

The RN to BSN program is designed for registered nurses who want to advance to a Bachelor of Science in Nursing. The two-year one hundred percent online program is geared for part-time students. Coursework focuses on the current health care system/environment, quality and safety, evidence-based practice, population-focused nursing, leadership and chronic health issues. The program is intended to educate nurses to practice with a transformed perspective, having a better understanding of themselves and the complex environment in which nurse's work.

Admission Requirements for RN-BSN

1. Admission to NDSU.
2. Completion of an associate of science in nursing or an associate of applied science in nursing.
3. Current unencumbered nurse license (RN).
4. Cumulative GPA of 2.75.
5. Transcripts from all post-secondary schools attended.
6. Completed School of Nursing application including personal statement and background check.
7. Interview upon request.

Demonstrated Competency Credits for RN-BSN

- 18 demonstrated competency credits will be awarded upon completion of the first semester to students who have earned an Associates of Applied Science Degree.

- 25 demonstrated competency credits will be awarded upon completion of the first semester to students who have earned an Associates of Science Degree.

The NDSU Online/Blended Accelerated (Post-Baccalaureate) BSN Nursing Program offers an opportunity to quickly build a path to a nursing degree. The Accelerated (Post-Baccalaureate) BSN Program is offered through the NDSU School of Nursing at Sanford Health site in Bismarck, North Dakota. Through this program, students build upon their prior bachelor's or graduate degree to accelerate into an in-demand opportunity in nursing.

The program will prepare students to become highly-skilled, compassionate nurses, and assist in meeting statewide healthcare workforce needs. The blended program includes in-person classes, with some online classes. Students are expected to attend all lab and clinical experiences in person.

Admission Requirements for Accelerated (Post Baccalaureate) BSN

1. Apply and be admitted to North Dakota State University (NDSU) or currently be an NDSU student.
2. Have a baccalaureate or graduate degree in a non-nursing major from a U.S. regionally accredited college or university. The degree must be completed and verified via official transcript(s) prior to enrollment in the program.
3. Cumulative GPA of a 2.75 or greater.
4. Complete the Accelerated (Post-Baccalaureate) BSN application.
5. Complete a Criminal Background Check (See College of Health Professions Policy 3.08).
   a. Fee paid by applicant via the school designated vendor.

For more information go to: https://www.ndsu.edu/nursing/degrees/accelerated_bsn/standard_accel_admit/

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Plan of Study: Pre-Licensure Fall Start Professional Program

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	3	ENGL 120	3
CHEM 117	3	BIOC 260	4
CHEM 117L	1	COMM 110	3
SOC 110 or ANTH 111	3	PSYC 111	3
PHIL 257	3	MICR 202	2
NURS 150	1	MICR 202L	1
	14		**16**
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
BIOL 220	3	BIOL 221	3
BIOL 220L	1	BIOL 221L	1
PSYC 250	3	HNES 250	3
NURS 301	3	NURS 321	3
NURS 306	3	NURS 360	4
Free Elective	3		
	16		**14**
Junior			
Fall	**Credits**	**Spring**	**Credits**
ENGL 325	3	NURS 352	4
NURS 341	3	NURS 362	4
NURS 342	5	NURS 382	4

NURS 300		4	Free Elective		3
		15			**15**

Senior					
Fall	**Credits**		**Spring**	**Credits**	
NURS 402		4	NURS 404		4
NURS 403		5	NURS 406		4
NURS 410		2	NURS 450		4
NURS 460		3	Gen Ed Humanities & Fine Arts/Glob Perspectives		3
Gen Ed Humanities & Fine Arts/Cult Diversity		3			
		17			**15**

Total Credits: 122

Pre-Licensure Spring Start Professional Program

First Year					
Fall	**Credits**		**Spring**	**Credits**	
ENGL 110		3	ENGL 120		3
NURS 150		1	MICR 202		2
CHEM 117		3	MICR 202L		1
CHEM 117L		1	PSYC 111		3
SOC 110 or ANTH 111		3	BIOC 260		4
PHIL 257		3			
		14			**13**

Second Year					
Fall	**Credits**		**Spring**	**Credits**	
BIOL 220		3	NURS 301		3
BIOL 220L		1	NURS 306		3
PSYC 250		3	BIOL 221		3
Elective		3	BIOL 221L		1
COMM 110		3	HNES 250		3
			Gen Ed Humanities & Fine Arts/Cult Div		3
		13			**16**

Third Year					
Fall	**Credits**		**Spring**	**Credits**	
NURS 321		3	ENGL 325		3
NURS 360		4	NURS 341		3
Gen Ed Humanities & Fine Arts/Glob Persp		3	NURS 342		5
Free Elective		3	NURS 300		4
		13			**15**

Fourth Year					
Fall	**Credits**		**Spring**	**Credits**	
NURS 352		4	NURS 402		4
NURS 362		4	NURS 403		5

NURS 382	4	NURS 410	2
		NURS 460	3
	12		**14**

Fifth Year	
Fall	**Credits**
NURS 404	4
NURS 406	4
NURS 450	4
	12

Total Credits: 122

Sample Program Guide

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LPN to BSN Program

- PN Program Transfer Credits = 40-60 credits
- Total Credits for a degree must = 120
- Nursing Validation (17 credits): NURS 362 Family Nursing II, NURS 352 Family Nursing I, NURS 402 Mental Health Nursing, NURS 403 Adult Health Nursing II

Second Year					
Fall	**Credits**	**Spring**	**Credits**		
BIOL 220	3	BIOL 221	3		
BIOL 220L	1	BIOL 221L	1		
PSYC 250	3	SOC 110	3		
Humanities/Fine Arts & Global Perspectives	3	Humanities/Fine Arts & Cultural Diversity	3		
	10		**10**		

Third Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
CHEM 117	3	NURS 305	3	ENGL 325	3
CHEM 117L	1	NURS 360	4	NURS 307	3
MICR 202	2	BIOC 260	4	NURS 420	3
MICR 202L	1				
	7		**11**		**9**

Fourth Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
NURS 372	2	NURS 407	3	NURS 406	4
NURS 374	2	NURS 463	4	NURS 407L	3
NURS 405	2			HNES 250	3
PSYC 111	3				
	9		**7**		**10**

Fifth Year		
Fall	**Credits**	
NURS 450		4
		4

Total Credits: 77

Sample Program Guide

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RN to BSN Program

- Total Credits for a degree = 120
- RN Program Transfer Credits = approximately 60 credits
- 60 credits toward degree must be earned from a four-year degree granting institution
  - Competency credits will count toward this requirement
- Demonstrated Competency Credits = 18 with an earned Associates of Applied Science **OR** 25 with an Associate of Science

First Year				
Fall	**Credits**		**Spring**	**Credits**
NURS 326		1	NURS 346	1
NURS 356		3	NURS 366	3
NURS 420		3	NURS 386	3
		7		**7**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
NURS 426		1	NURS 456	1
NURS 446		3	NURS 462	3
NURS 446L		1	NURS 462L	1
ENGL 325		3	NURS 478	3
		8		**8**

Total Credits: 30

Sample Program Guide

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Accelerated BSN

This program is for those who have completed a non-nursing bachelor's degree or have completed a graduate degree.

First Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
NURS 300	4	NURS 342	5	NURS 402	4
NURS 303	3	NURS 352	4	NURS 430	6
NURS 323	4	NURS 362	4		
NURS 360	4	NURS 463	4		

NURS 420	3		
	18	**17**	**10**
Second Year			
Fall	**Credits**		
NURS 406	4		
NURS 450	4		
	8		

Total Credits: 53

Nursing

Department Information

- **Department Web Site:**
  www.ndsu.edu/nursing/ (http://www.ndsu.edu/nursing/)
- **Credential Offered:**
  B.S.N.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/nursing/ (http://catalog.ndsu.edu/programs-study/undergraduate/nursing/)

Degree Requirements

Major: Nursing - Pre-Licensure Track

Degree Type: B.S.N.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**
Category A: Humanities and Fine Arts †		**6**
Category B: Social and Behavioral Sciences †		**6**
Category W: Wellness †		**2**
Category D: Cultural Diversity *†		

Category G: Global Perspectives [*†]	
Total Credits	**39**

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

All students must complete all major requirements with a grade of C or better including ENGL 120 and COMM 110.

Code	Title	Credits
Nursing Major Requirements		
NURS 150	Academic Success and Career Exploration [1]	1
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab [2]	4
BIOC 260	Elements of Biochemistry	4
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab [2]	3
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory [2]	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory [2]	4
HNES 250	Nutrition Science	3
ENGL 325	Writing in the Health Professions	3
NURS 300	Pharmacology & Pathophysiology for Nursing	4
NURS 301	Introduction to Nursing and Evidence Based Practice	3
NURS 306	Health Promotion	3
NURS 321	Foundations of Nursing I	3
NURS 341	Foundations of Clinical Nursing	3
NURS 342	Adult Health Nursing I	5
NURS 352	Family Nursing I	4
NURS 360	Health Assessment	4
NURS 362	Family Nursing II	4
NURS 382	Clinical Applications in Nursing	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
PSYC 111	Introduction to Psychology [2]	3
PSYC 250	Developmental Psychology	3
or HDFS 230	Life Span Development	
SOC 110	Introduction to Sociology [2]	3
or ANTH 111	Introduction to Anthropology	
Total Credits		**98**

1
NURS 150 is required for students with fewer than 24 earned transfer credits.

2

Will be used in the selective GPA calculation for admission to the 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 Health and Human Sciences. A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the College.
- 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 - LPN to BSN Track

Degree Type: B.S.N.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

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

*

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

All students must complete all major requirements with a grade of 'C' or better including ENGL 120 and COMM 110.

Code	Title	Credits
Nursing Major Requirements		
BIOC 260	Elements of Biochemistry	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory *	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory *	4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab	4
HNES 250	Nutrition Science *	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab *	3
NURS 321	Foundations of Nursing I	3
NURS 322	Gerontologic Nursing	2
NURS 300	Pharmacology & Pathophysiology for Nursing	4
NURS 305	Transitioning Professional Identity	3
NURS 307	Concepts of Adult Health Nursing	3
NURS 341	Foundations of Clinical Nursing	3
NURS 342	Adult Health Nursing I	5
NURS 352	Family Nursing I (validation)	4
NURS 360	Health Assessment	4
NURS 362	Family Nursing II (validation)	4
NURS 372	Expanded Family Nursing I	2
NURS 374	Expanded Family Nursing II	2
NURS 402	Mental Health Nursing (validation)	4
NURS 403	Adult Health Nursing II (validation)	5
NURS 405	Psychsocial Nursing	2
NURS 406	Community & Public Health Nursing	4
NURS 407	Adult Health: Complex Problems	3
NURS 407L	Expanded Clinical Practice for the LPN-BSN	3
NURS 420	Evidence-Based Practice and Research in Nursing	3
NURS 463	Leadership and Interprofessional Health Care	4
NURS 450	Nursing Synthesis/Practicum	4
PSYC 111	Introduction to Psychology	3
PSYC 250	Developmental Psychology *	3
SOC 110	Introduction to Sociology *	3
or ANTH 111	Introduction to Anthropology	
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 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Total Credits		**105**

*

Will be used in the selective GPA calculation for admission to the Nursing major program.

Degree Requirements and Notes

- Students must maintain a semester GPA of 2.0 or above for each semester in the College of Health Professions (CoHP). A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the CoHP.
- Would also accept the following course sequence in place of CHEM 117 Chemical Concepts and Applications/CHEM 117L Chem Concepts and Applications Lab: CHEM 121 General Chemistry I/CHEM 121L General Chemistry I Laboratory, CHEM 122 General Chemistry II/CHEM 122L General Chemistry II Laboratory or CHEM 121 General Chemistry I/CHEM 121L General Chemistry I Laboratory and CHEM 140 Organic Chemical Concepts and Applications.

Major Requirements

Major: Nursing - RN to BSN Track

Degree Type: B.S.N.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Demonstrated Competency Credit (see notes below)		
Nursing Major Requirements		
NURS 326	Immersion I	1

NURS 346	NDSU RN to BSN Immersion II	1
NURS 356	The Essence of Nursing	3
NURS 366	Quality and Safety in Nursing	3
NURS 386	Chronicity Throughout the Lifespan I	3
NURS 420	Evidence-Based Practice and Research in Nursing	3
NURS 426	NDSU RN to BSN Immersion III	1
NURS 446	Population Focused Nursing Care	3
NURS 446L	Population Focused Nursing Care - Clinical	1
NURS 456	RN to BSN Immersion IV	1
NURS 462	Nurses as Leaders	3
NURS 462L	Nursing Leadership Practicum	1
NURS 478	BSN Capstone	3
Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 322	Writing and the Creative Process	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Total Credits		**30**

Requirements and Degree Notes:

- Students must maintain a semester GPA of 2.0 or above for each semester in the College of Health Professions (CoHP). A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the CoHP.
- 30 credits must be earned in residence at NDSU.
- 18 demonstrated competency credits will be awarded upon completion of the first semester to students who have earned an Associates of Applied Science Degree.
- 25 demonstrated competency credits will be awarded upon completion of the first semester to students who have earned an Associates of Science Degree.

Major Requirements

Major: Nursing - Post Baccalaureate Track

Degree Type: B.S.N.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Students in the post-baccalaureate track have already completed a bachelor's egree.		
NURS 300	Pharmacology & Pathophysiology for Nursing	4
NURS 303	Introduction to the Nursing Profession	3
NURS 342	Adult Health Nursing I	5
NURS 352	Family Nursing I	4
NURS 362	Family Nursing II	4
NURS 463	Leadership and Interprofessional Health Care	4
NURS 323	Skills and Concepts of Clinical Nursing	4
NURS 360	Health Assessment	4
NURS 402	Mental Health Nursing	4
NURS 406	Community & Public Health Nursing	4
NURS 420	Evidence-Based Practice and Research in Nursing	3
NURS 430	Comprehensive Adult Health	6
NURS 450	Nursing Synthesis/Practicum	4
Total Credits		**53**

Organizational Leadership

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/organizational-leadership/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/organizational-leadership/)

The program is an undergraduate certificate in Organizational Leadership and is available to all students regardless of major. Students earning the certificate will learn contemporary leadership concepts and practices that will empower them to be leaders within their organizations and communities. Students will be exposed to modern leadership concepts, learn their personal leadership style, and expand their leadership skills to meet the demands of the modern organization. The program will provide students the knowledge and skills to lead teams and organizations entrepreneurially, virtually and ethically.

Organizational Leadership

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/organizational-leadership/ (http://catalog.ndsu.edu/programs-study/undergraduate/organizational-leadership/)

Certificate Requirements

Certificate: Organizational Leadership

Required Credits: 9

Code	Title	Credits
MGMT 430	Leadership in Organizations (MGMT 320 pre-requisite)	3
MGMT 434	Leading Virtual Teams (MGMT 320 pre-requisite)	3
MGMT 436	Ethical Leadership	3
Total Credits		**9**

Pharmacy

Department Information

- **Department Web Site:**
  www.ndsu.edu/pharmacy/ (http://www.ndsu.edu/pharmacy/)
- **Credential Offered:**
  B.S.; Pharm.D.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/pharmacy/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/pharmacy/)

The Pharmacy program (PharmD) encompasses both the basic and clinical sciences and is designed to provide you 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 current entry-level PharmD curriculum is designed to give you 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 PharmD degree prepares you to accept positions in community, hospital, managed care, clinical, and industrial pharmacy. Other potential opportunities include administrative positions in pharmaceutical companies and associations. Also, teaching and research positions in universities and the pharmaceutical industry are excellent opportunities for those with advanced training in pharmacy.

There are four routes to pursue admission to NDSU's PharmD program.

Option 1: The Early Admission Pathway (https://www.ndsu.edu/pharmacy/degrees_and_programs/pharmacy_program/eap/)

The Early Admission Pathway (EAP) to NDSU's PharmD program is designed for academically qualified high school students who want an affordable, expedited path to a PharmD degree. If you are interested in EAP, you would apply during your senior year in high school.

Option 2: The Traditional Admissions Pathway (https://www.ndsu.edu/pharmacy/degrees_and_programs/pharmacy_program/traditional_pathway/)

The Traditional Admissions Pathway involves you entering the program as an undergraduate in pre-pharmacy upon meeting general admission standards of the university. Once all required pre-pharmacy coursework is satisfied, you can apply to the PharmD program. The pre-pharmacy course work may be completed at other institutions and NDSU reviews transfer records submitted and determine if equivalent to NDSU requirements.

You are admitted to the final four professional years on a competitive basis after meeting specific admission requirements of the college which can be found on the Traditional Pathway page (https://www.ndsu.edu/pharmacy/degrees_and_programs/pharmacy_program/traditional_pathway/). Students attending other institutions must maintain frequent contact with the college to determine appropriate course work.

The college is a member of the American Association of Colleges of Pharmacy, and is accredited by the Accreditation Council for Pharmacy Education (ACPE).

Option 3: The Post-Baccalaureate Pathway (https://www.ndsu.edu/pharmacy/degrees_and_programs/pharmacy_program/post_bac/)

Students who will hold a four-year bachelor degree in a health or STEM field on or before May 2025 are eligible to apply for admission to NDSU's PharmD program through a new, streamlined pathway. The pathway has fewer requirements because many of our admission requirements are implicitly met by students who have completed a bachelor degree in a health or STEM field. If an applicant holds a bachelor degree in a health or STEM field and is missing key pre-requisites, we offer a means to complete those courses in the summer before starting the PharmD program.

Note: the NDSU Pharmacy Program encourages applicants holding a four-year bachelor degree in an array of health or STEM fields, from any accredited college or university that offers four-year bachelor programs.

Option 4: Pharmacy Technician Pathway (https://www.ndsu.edu/pharmacy/degrees_and_programs/pharmacy_program/pharmtech_pharmd/)

Are you a pharmacy technician who is eligible for pharmacy technician licensure in North Dakota, and who is interested in becoming a pharmacist? If so, this new pathway is designed to provide you with a streamlined pathway to meet the NDSU Pharmacy Program's admission requirements. If you completed a pharmacy technician program at a college or university and received academic credit for your program, all of those credits will count towards meeting our admission requirements.

Differential Tuition

Students in the pharmacy professional program (i.e, the final five years of study for students on the **early admission path**, and the final four years for students on the **traditional admission path**) are assessed a different tuition rate. This differential tuition is assessed to cover the higher costs associated with the program.

Current Curriculum

The curriculum leading to the Pharm.D. degree requires a minimum of six years of study. Approximately 77 semester hours are required in the pre-professional curriculum. The vast majority of required pre-professional courses (listed by name and number) must be completed by the end of spring term prior to admission to the professional program for traditional path students, or for early admission students, the final four years of the professional program. A maximum of six elective credits may be taken during the summer prior to entrance in the professional program.

The four-year professional program is divided into three years of didactic education on campus and one year (40 weeks) of experiential training (advanced pharmacy practice experience) with qualified preceptors at various practice sites. Additional introductory experiential training occurs during the summer sessions following the first and second years of the professional program, as well as during the third professional academic year. A wide variety of experiential rotation offerings are available to students. Students should plan to travel outside the Fargo-Moorhead area to fulfill their experiential program requirements.

Our pharmacy program partners with PioneerRx *(*http://www.pioneerrx.com*/), a pharmacy management system, to simulate the functions of today's pharmacies.*

Pre-Pharmacy Traditional Pathway

All students interested in NDSU's Doctor of Pharmacy program must be accepted to study a major at NDSU. A formal NDSU application for admission must be submitted through the Office of Admission website (https://www.ndsu.edu/admission/) by all applicants, with exception of current or former NDSU students. Former students must apply for readmission to NDSU through the NDSU readmission page (https://www.ndsu.edu/admission/how_to_apply/readmission/).

In addition, students interested in pharmacy must apply to the professional pharmacy program. All applicants to the NDSU Doctor of Pharmacy program must apply using the through the link below.

A cumulative grade point average of 3.0 or higher is required before an applicant will be evaluated. Applicants who are NOT currently NDSU students must submit official transcripts of previous academic work to the University's Admissions Office and one set to the NDSU School of Pharmacy.

- PharmD Technical Standards. Students must meet ALL of these technical standards to be eligible for admission to the NDSU Doctor of Pharmacy program. Please reviews these standards before applying.

Sample Program Guide - Pre-Pharmacy Traditional Path

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should

utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

PRE-PHARMACY PROGRAM REQUIREMENTS

Plan follows most closely with Traditional 3-year pathway plan with allows room for a minor of study, other pathways may differ slightly

First Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 150*	3	BIOL 151*	3
BIOL 150L*	1	BIOL 151L*	1
CHEM 121*	3	CHEM 122*	3
CHEM 121L	1	CHEM 122L	1
ENGL 110	3	COMM 110*	3
MATH 146*	4	ECON 201*	3
PHRM 190	3	ENGL 120[1] *	3
		STAT 330*	3
	18		**20**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 220*	3	BIOL 221	3
BIOL 220L*	1	BIOL 221L	1
CHEM 341	3	CHEM 342	3
CHEM 341L	1	PHYS 211	3
Gen Ed Social/Behavioral Sci and Cultural Diversity	3	Gen Ed Humanities and Fine Arts	3
Gen Humanities & Fine Arts	3	Credits Towards Minor[2]	3
Wellness Gen Ed	2		
	16		**16**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
BIOC 460	3	BIOC 461	3
MICR 350*	3	ENGL 324 or 325	3
MICR 350L*	2	Credits Towards a Minor[2]	12
Credits towards Minor[2]	9		
	17		**18**

Total Credits: 105

*

Selected core courses will be used for selection criteria to determine GPA in calculation for admission to the professional program.

1

Course can be taken fall semester if student tests out of ENGL 110

2

Minor not required but plan built to allow

Pre-Pharmacy EAP Pathway

The Early Admission Pathway (EAP) to NDSU's PharmD program is an early assurance program designed for academically qualified high school students who want an affordable, expedited path to a PharmD degree. If you are interested in EAP, you would apply during your senior year in high school. Acceptance into the EAP programs means that you are conditionally accepted to the PharmD program. As long as you successfully complete all requirements to maintain your spot, we assure you a seat in the final four years of the PharmD program. Thus if you meet program requirements, it

is a six-year path (saves up to 2 years of time in college). Sophomore EAP (P.5) students pay differential tuition and are considered professional-level students.

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

PRE-PHARMACY EAP PROGRAM REQUIREMENTS

Plan follows most closely with EAP 2-year pathway plan, other pathways may differ slightly. Differential tuition applies to second year of coursework.

First Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
BIOL 150	3	BIOL 151	3	Gen Humanities & Fine Arts[2]	3
BIOL 150L	1	BIOL 151L	1		
CHEM 121	3	CHEM 122	3		
CHEM 121L	1	CHEM 122L	1		
ENGL 110	3	COMM 110	3		
MATH 146	4	ECON 201	3		
PHRM 190	3	ENGL 120[1]	3		
		STAT 330	3		
	18		**20**		**3**
Second Year					
Fall	**Credits**	**Spring**	**Credits**		
BIOL 220	3	BIOL 221	3		
BIOL 220L	1	BIOL 221L	1		
MICR 350	3	PHRM 324	3		
MICR 350L	2	PHYS 211	3		
PSCI 300	5	PSCI 301	5		
Gen Ed Social/Behavioral Sci and Cultural Diversity	3	Gen Ed Humanities and Fine Arts	3		
Wellness Gen Ed	2				
	19		**18**		

Total Credits: 78

1

Course can be taken fall semester if student tests out of ENGL 110

2

If not already taken or will take during another semester.

The Pharmacy program (PharmD) encompasses both the basic and clinical sciences and is designed to provide you 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 current entry-level PharmD curriculum is designed to give you 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 PharmD degree prepares you to accept positions in community, hospital, managed care, clinical, and industrial pharmacy. Other potential opportunities include administrative positions in pharmaceutical companies and associations. Also, teaching and research positions in universities and the pharmaceutical industry are excellent opportunities for those with advanced training in pharmacy.

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Code	Title	Credits
P1 First Year Professional		
MICR 470	Basic Immunology	3
PSCI 367	Pharmaceutical Calculations	1
PSCI 368	Pharmaceutics I	3
PSCI 369	Pharmaceutics II	2
PSCI 410	Pharmaceutical Biotechnology	2
PSCI 411	Principles of Pharmacokinetics and Pharmacodynamics	3
PSCI 412	Chemotherapeutic/Infectious Disease Pharmacodynamics	3
PSCI 470	Pharmacokinetics	3
PHRM 301	Top Drugs I	1
PHRM 340	Patient Assessment and Pathophysiology I	4
PHRM 341	Pathophysiology II	3
PHRM 351L	Pharmacy Practice Laboratory I	2
PHRM 353	Introduction to Pharmacy and the Health Care System	3
PHRM 360	Introduction to Drug Literature	1
PHRM 455	Community Introductory Pharmacy Practice Experience	4
PHRM 565	Pharmacy-Based Immunization Delivery	1
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 355	Institutional Introductory Pharmacy Practice Experience	3
PHRM 499	Interprofessional Education Course	1
PHRM 400	Top Drugs II	1
PHRM 450	Self Care	3
PHRM 480	Evidence Based Medicine	2
PHRM 452L	Pharmacy Practice Laboratory II	2
PHRM 532	Infectious Disease	3
PHRM 534	Rheumatology/Endocrinology/Gastrointestinal	3
PHRM 535	Hematology and Oncology	3
PHRM 538	Cardiovascular and Pulmonary Diseases	4
P3 Third Year Professional		
PHRM 500	Top Drugs III	1
PHRM 520	Special Populations	3
PHRM 536	Neurology & Psychiatry Pharmacotherapy	3
PHRM 537	Renal Disease/Fluid and Electrolytes	2
PHRM 540	Public Health for Pharmacists	3
PHRM 545L	Pharmacotherapy Laboratory	1
PHRM 551L	Pharmacy Practice Laboratory III	2
PHRM 552L	Pharmacy Practice Laboratory IV	2
PHRM 560	Specialty Care Topics	2
PHRM 570	Pharmacy Practice Improvement and Project Management	2
PHRM 572	Pharmacy Law and Ethical Considerations	3
PHRM 575	Pharmacy Practice Management	3
PHRM 580	Pharmacotherapy Capstone	3

Professional Electives [List of professional electives in handbook and in Blackboard PharmD Student Community.]		**6**
P4 Fourth Year Professional		
PHRM 576	Essentials for Pharmacist Licensure I	1
PHRM 577	Essentials for Pharmacist Licensure II	2
PHRM 578	Essentials for Pharmacist Licensure III	2
Student will choose 8 out of 9 rotations for a total of 40 credits. Each rotation is 5 credits.		40
PHRM 581	Advanced Pharmacy Practice Experience - Rotation I	
PHRM 582	Advanced Pharmacy Practice Experience - Rotation II	
PHRM 583	Advanced Pharmacy Practice Experience - Rotation III	
PHRM 584	Advanced Pharmacy Practice Experience - Rotation 4	
PHRM 585	Advanced Pharmacy Practice Experience - Rotation 5	
PHRM 586	Advanced Pharmacy Practice Experience - Rotation 6	
PHRM 587	Advanced Pharmacy Practice Experience - Rotation 7	
PHRM 588	Advanced Pharmacy Practice Experience - Rotation 8	
PHRM 589	Advanced Pharmacy Practice Experience - Rotation 9	
Total Credits		**156**

Pharmacy

Department Information

- **Department Web Site:**
  www.ndsu.edu/pharmacy/ (http://www.ndsu.edu/pharmacy/)
- **Credential Offered:**
  B.S.; Pharm.D.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/pharmacy/ (http://catalog.ndsu.edu/programs-study/undergraduate/pharmacy/)

Major Requirements

Major: Pharmaceutical Sciences (Includes Pre-Pharmacy) Requirements

Degree Type: B.S.
Minimum Degree Credits to Graduate: 127-136

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Pre-Pharmacy Requirements

DEGREE NOTES:

- Student admitted to the Pharm.D. program will earn a Bachelor of Science Degree with a major in Pharmaceutical Sciences with successful completion of all courses through the second year of the professional Pharm.D. program as well as undergraduate graduation requirements including general education.
- Selected Core Courses - see information below for grading and GPA information.

Code	Title	Credits
BIOL 150 & 150L	General Biology I and General Biology I Laboratory *	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory *	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory *	4
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
CHP 190		3
COMM 110	Fundamentals of Public Speaking *	3
ECON 201	Principles of Microeconomics *	3
ENGL 120	College Composition II *	3
MATH 146	Applied Calculus I *	4
MICR 350 & 350L	General Microbiology and General Microbiology Lab *	5
PHYS 211	College Physics I	3
STAT 330	Introductory Statistics *	3
Biochemistry - select from below: [1]		5 or 6
BIOC 460 & BIOC 461	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry and Molecular Biology II	
PSCI 301	Biochemistry and Molecular Biology for Pharmacists (Limited to Early Admission Pathway (EAP) students)	
Organic Chemistry - select from below: [1]		5 or 7
CHEM 341 & 341L & CHEM 342	Organic Chemistry I and Organic Chemistry I Laboratory and Organic Chemistry II *	
PSCI 300	Pharmaceutical Organic Chemistry (Limited to Early Admission Pathway (EAP) students)	
Upper Division Writing - select from below [1]		3
ENGL 324	Writing in the Sciences	
or ENGL 325	Writing in the Health Professions	
PHRM 324	Writing and Professionalization in Pharmacy (Limited to Early Admission Pathway (EAP) students)	
Professional Pharmacy P1 & P2 Years		**72-76**

1
Curricular plan based on traditional admissions path or early acceptance path. Consult adviser for additional information.

Selected Core Courses

Selected core courses will be used for selection criteria to determine GPA used in calculation for admission to the professional program. These courses must show evidence of letter grade, or other means of demonstrating acceptable competency (i.e. AP – CEEB) and MUST be completed by the end of fall semester prior to the admissions deadline to apply to the pharmacy program. Remaining courses, which are required and listed in

the pre-pharmacy curriculum, MUST be completed by the end of spring term. The only exception to this is that up to six credits of electives may be completed during the summer term.

Pre-Professional Pharmacy Requirements and Notes

- **All courses listed for pre-pharmacy must be complete in order to apply for the professional program in the last spring semester in which pre-requisite courses are taken.**

Degree Requirements and Notes

- All required courses must be completed with a grade of 'C' or above.
- All students must maintain a semester GPA of 2.0 or above for each semester in the College. A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the College of Health Professions.

Major Requirements

Major: Doctor of Pharmacy

Degree Type: Pharm.D.
Minimum Degree Credits to Graduate: 156

Professional Pharm.D. Requirements

The following Pharm.D. requirements included here are subject to change per department. Students follow the curricula developed by the School of Pharmacy and any changes that occur while in the program will be communicated to the students by the School of Pharmacy. All courses must be completed with a grade of "C" or higher or "P" if a pass/fail course.

In addition to curriculum listed below, 6 credits of Professional Elective MUST be completed PRIOR to P4 year. Other changes to curriculum will be conveyed to students as they are approved.

Code	Title	Credits
P1 First Year Professional		
MICR 470	Basic Immunology	3
PSCI 367	Pharmaceutical Calculations	1
PSCI 368	Pharmaceutics I	3
PSCI 369	Pharmaceutics II	2
PSCI 410	Pharmaceutical Biotechnology	2
PSCI 411	Principles of Pharmacokinetics and Pharmacodynamics	3
PSCI 412	Chemotherapeutic/Infectious Disease Pharmacodynamics	3
PSCI 470	Pharmacokinetics	3
PHRM 301	Top Drugs I	1
PHRM 340	Patient Assessment and Pathophysiology I	4
PHRM 341	Pathophysiology II	3
PHRM 351L	Pharmacy Practice Laboratory I	2
PHRM 353	Introduction to Pharmacy and the Health Care System	3
PHRM 360	Introduction to Drug Literature	1
PHRM 455	Community Introductory Pharmacy Practice Experience	4
PHRM 565	Pharmacy-Based Immunization Delivery	1
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 355	Institutional Introductory Pharmacy Practice Experience	3
PHRM 400	Top Drugs II	1
PHRM 450	Self Care	3
PHRM 452L	Pharmacy Practice Laboratory II	2
PHRM 480	Evidence Based Medicine	2
PHRM 532	Infectious Disease	3
PHRM 534	Rheumatology/Endocrinology/Gastrointestinal	3

PHRM 535	Hematology and Oncology	3
PHRM 538	Cardiovascular and Pulmonary Diseases	4
Interprofessional Health Care Course [1]		1
P3 Third Year Professional		
PHRM 500	Top Drugs III	1
PHRM 520	Special Populations	3
PHRM 536	Neurology & Psychiatry Pharmacotherapy	3
PHRM 537	Renal Disease/Fluid and Electrolytes	2
PHRM 540	Public Health for Pharmacists	3
PHRM 545L	Pharmacotherapy Laboratory	1
PHRM 551L	Pharmacy Practice Laboratory III	2
PHRM 552L	Pharmacy Practice Laboratory IV	2
PHRM 560	Specialty Care Topics	2
PHRM 570	Pharmacy Practice Improvement and Project Management	2
PHRM 572	Pharmacy Law and Ethical Considerations	3
PHRM 575	Pharmacy Practice Management	3
PHRM 580	Pharmacotherapy Capstone	3
Professional Electives [2]		**6**
P4 Fourth Year Professional		
Essentials for Pharmacist Licensure I-III		
PHRM 576	Essentials for Pharmacist Licensure I (Essentials for Pharmacist Licensure I is name of course)	1
PHRM 577	Essentials for Pharmacist Licensure II (Essentials for Pharmacist Licensure II is name of course)	2
PHRM 578	Essentials for Pharmacist Licensure III (Essentials for Pharmacist Licensure III is name of the course)	2
Student will choose 8 out of 9 rotations for a total of 40 credits. Each rotation is 5 credits.		40
PHRM 581	Advanced Pharmacy Practice Experience - Rotation I	
PHRM 582	Advanced Pharmacy Practice Experience - Rotation II	
PHRM 583	Advanced Pharmacy Practice Experience - Rotation III	
PHRM 584	Advanced Pharmacy Practice Experience - Rotation 4	
PHRM 585	Advanced Pharmacy Practice Experience - Rotation 5	
PHRM 586	Advanced Pharmacy Practice Experience - Rotation 6	
PHRM 587	Advanced Pharmacy Practice Experience - Rotation 7	
PHRM 588	Advanced Pharmacy Practice Experience - Rotation 8	
PHRM 589	Advanced Pharmacy Practice Experience - Rotation 9	
Total Credits		**156**

1

Interprofessional Health Care course currently taught as PHRM 499, a permanent number will be chosen for 2025-2026 academic year.

2

List of professional electives in handbook/Blackboard. Must be completed before P4 year.

Students applying to the Doctor of Pharmacy Program

- Applicants who are NOT currently NDSU students must submit official transcripts of all previous academic work to the University's Admissions Office.
- Students not previously enrolled at NDSU must apply both to NDSU and to the School of Pharmacy within College of Health and Human Sciences. Visit NDSU's application page (https://www.ndsu.edu/apply/) to apply.

Philosophy, Ethics, and Applied Humanities

Department Information

- **Department Web Site:**
  www.ndsu.edu/history/philosophy/ (http://www.ndsu.edu/history/philosophy/)
- **Credential Offered:**
  B.A.; B.S.; Minor
- **Official Program Curriculum:**

catalog.ndsu.edu/undergraduate/program-curriculum/philosophy-ethics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/philosophy-ethics/)

The Program

People have always had fundamental questions about the world in which they live, such as what is truth, knowledge, morality, goodness, or life's meaning? By means of dialogue, logic, critical reasoning, and creative thought, philosophers have trailblazed pathways to practical wisdom and an understanding of the human condition, which not only helps our students live more fulfilled lives but makes them more competitive in their careers.

The Faculty

- Dennis Cooley
- Anthony Flood
- Bradley Morris
- Adam Taylor

The Major

The Philosophy, Ethics, and Applied Humanities major consists of 32 semester credits: 15 required and 17 elective credits, which can be independent studies, complete the major.

The Minor

The Philosophy, Ethics, and Applied Humanities minor consists of 21 semester credits: 12 required and 9 elective credits, which can be independent studies, complete the minor.

Independent Study

Independent study along the lines of Oxford tutorials may be pursued by students wanting to read on a special philosophical topic (e.g., aesthetics) or read the work of a particular philosopher. To initiate independent study, students must contact a philosophy faculty member.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	3	ENGL 120	3
PHIL 101	3	PHIL 210 or 215	3
PHIL 257	3	GE Quantitative Reasoning	3
GE Science and Technology	3	GE Science and Technology	3
GE Social and Behavioral Science	3	GE Social and Behavioral Science & Cultural Diversity	3
	15		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	PHIL 323 or 324	3
PHIL 321 or 322	3	GE Humanities & Fine Arts	3
GE Humanities & Fine Arts and Global Perspectives	3	GE Wellness	2
GE Science and Technology w/ Lab	4	Minor or Free Elective	3
Minor/Free Elective	3	Free Electives	6
	16		**17**

Third Year				
Fall	**Credits**		**Spring**	**Credits**
PHIL 450, 486, or 494		3	PHIL 451	3
Gen Ed Upper Division Writing		3	Minor or Free Elective	3
Minor or Foreign Language		3	Minor or Foreign Language	3
Minor or Free Elective		6	Minor or Free Elective	5
		15		**14**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
PHIL/HUM Electives		6	PHIL/HUM Electives	5
Minor or Foreign Language		3	Minor or Foreign Language	3
Minor or Free Electives		5	Minor or Free Electives	6
		14		**14**

Total Credits: 120

Philosophy

Department Information

- **Department Web Site:**
  www.ndsu.edu/history/philosophy/ (http://www.ndsu.edu/history/philosophy/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/philosophy-ethics/ (http://catalog.ndsu.edu/programs-study/undergraduate/philosophy-ethics/)

Major Requirements

Major: Philosophy, Ethics, and Applied Humanities

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	

Upper Division Writing †	
Category R: Quantitative Reasoning †	**3**
Category S: Science and Technology †	**10**
Category A: Humanities and Fine Arts †	**6**
Category B: Social and Behavioral Sciences †	**6**
Category W: Wellness †	**2**
Category D: Cultural Diversity *†	
Category G: Global Perspectives *†	
Total Credits	**39**

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Code	Title	Credits
Core Requirements		
PHIL 101	Introduction to Philosophy	3
or PHIL 111	Professional Responsibility and Ethics	
or PHIL 210	Ethics	
or PHIL 215	Contemporary Moral Issues	
PHIL 257	Traditional Logic	3
PHIL 352	Knowledge and Reality	3
PHIL 369	Philosophy of Religion	3
or PHIL 221	Indian Philosophical Tradition	
PHIL 470	Social and Political Philosophy	3
Major Electives		
Select a minimum of 17 credits from the following:		17
PHIL 101	Introduction to Philosophy *	
PHIL 111	Professional Responsibility and Ethics *	
PHIL 157	Critical Thinking and Informal Logic	
PHIL 210	Ethics *	
PHIL 215	Contemporary Moral Issues *	
PHIL 216	Business Ethics	
PHIL 221	Indian Philosophical Tradition *	
PHIL 225	Environmental Ethics	
PHIL 327	Ethics, Engineering, and Technology	
PHIL 494	Individual Study	
ARCH 321	History and Theory of Architecture I	
COMM 431	Communication Ethics and Law	
CJ 230	Criminology	
CSCI 404	Ethical Hacking	
ECON 205	Market Values	
ECON 356	History of Economic Thought	
ENGL 240	World Literature Masterpieces	
HIST 328	War and Society in America	
HIST 449	Ancient Rome: From Republic to Empire	
MRKT 350	Creativity and Innovation	
MS 302	Leadership and Ethics	
NURS 356	The Essence of Nursing	
NRM 225	Natural Resources & Agrosystems	
POLS 225	Comparative Politics	

POLS 231	Law and Society
RELS 100	World Religions
RELS 240	"Cults" and New Religious Movements
SPAN 330	Introduction to Spanish Civilization
SPAN 331	Introduction to Spanish American Civilization
WGS 112	Introduction to Masculinities
WGS 370	Transnational/Global Women
Total Credits	**32**

*
Course may be taken as a major elective if not take as part of the core requirements.

mAJOR rEQUIREMENTS AND NoteS:

- A waiver to any of the major requirements listed above is not possible. Students must complete a minimum of 32 credits for this major.

Minor Requirements

Minor: Philosophy, Ethics, and Applied Humanities

Required Credits: 18

Code	Title	Credits
Required Minor Courses		
PHIL 101	Introduction to Philosophy	3
PHIL 111	Professional Responsibility and Ethics	3
or PHIL 210	Ethics	
or PHIL 215	Contemporary Moral Issues	
PHIL 221	Indian Philosophical Tradition	3
or PHIL 352	Knowledge and Reality	
or PHIL 369	Philosophy of Religion	
or PHIL 470	Social and Political Philosophy	
PHIL 257	Traditional Logic	3
Philosophy Electives		
Select from the following:		6
PHIL 111	Professional Responsibility and Ethics *	
PHIL 210	Ethics *	
PHIL 215	Contemporary Moral Issues *	
PHIL 216	Business Ethics	
PHIL 221	Indian Philosophical Tradition *	
PHIL 225	Environmental Ethics	
PHIL 327	Ethics, Engineering, and Technology	
PHIL 352	Knowledge and Reality *	
PHIL 369	Philosophy of Religion *	
PHIL 450	Metaphysics	
PHIL 470	Social and Political Philosophy *	
PHIL 494	Individual Study	
ARCH 321	History and Theory of Architecture I	
COMM 431	Communication Ethics and Law	
CJ 230	Criminology	
CSCI 404	Ethical Hacking	
ECON 205	Market Values	
ECON 356	History of Economic Thought	
ENGL 240	World Literature Masterpieces	
HIST 328	War and Society in America	
HIST 449	Ancient Rome: From Republic to Empire	

MRKT 350	Creativity and Innovation
MS 302	Leadership and Ethics
NURS 356	The Essence of Nursing
NRM 225	Natural Resources & Agrosystems
POLS 225	Comparative Politics
POLS 231	Law and Society
RELS 100	World Religions
RELS 240	"Cults" and New Religious Movements
SPAN 330	Introduction to Spanish Civilization
SPAN 331	Introduction to Spanish American Civilization
WGS 112	Introduction to Masculinities
WGS 370	Transnational/Global Women
Total Credits	**18**

*
Course may be taken as an elective if not taken as part of the core requirements.

Minor Requirements and Notes

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

Physical Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/physical-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/physical-education/)

The Physical Education (https://www.ndsu.edu/hpe/undergraduate_programs/physical_education/) program provides opportunities for students to become critical thinkers, creative planners and effective practitioners in various physical activity contexts. To be successful in this field, one must a) develop foundational knowledge within the physical, biological and social sciences and be able to apply this knowledge through best practices; b) be able to plan and facilitate physically and emotionally safe activities, and c) have a professional disposition committed to ethical behavior, respecting individual differences, and helping individuals learn and grow.

Physical Education Program Options

Option One: K-12 Teacher Licensure

The licensure program prepares students with the skills and techniques necessary to begin a successful teaching career in K-12 physical education. The program is aligned with both the Society of Health and Physical Educators of America Initial Physical Education Teacher Education Standards (https://www.shapeamerica.org/accreditation/peteacherprep.aspx) and the Physical Education standards set forth by the North Dakota Education Standards and Practices Board (ESPB). Courses are strategically structured to be sequential in nature. Teacher candidates develop their teaching skills and confidence through a variety of hands-on teaching experiences prior to student teaching. These experiences include our unique NDSU Let's Move in Homeschool physical education program held on campus each fall and spring as well as Adopt-a-School service-learning program.

Students take courses in both the Health, Physical Education, and Recreation (HPER) and the School of Education (SOE). Students are fully admitted into the program when they have met the admission requirements established by the SOE. Coursework concludes with a culminating semester-long student teaching experience and graduates of this option meet the requirements for K-12 physical education licensure.

Teacher candidates in this option may enroll in the 300-level professional education courses before being formally admitted to the SOE. Prior to enrolling in the 400-level EDUC courses, teacher candidates must complete the application for admission to the SOE; earn required grades in all core physical education courses (as specified in the handbook); maintain at least a 2.75 cumulative grade point average in their course work and education courses; and pass the Core Academic Skills for Educators test or meet minimum scores on the ACT+. Requirements for admission can be found on the **School of Education website**.

STUDENT TEACHING

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

DOUBLE MAJOR

It is recommended that physical education majors obtain a degree enhancement through licensing, certification or a double major. The physical education curriculum has been structured to allow students to also complete a health education major during the same four-year time frame. The acquisition of additional credentials helps to prepare future professionals, giving them a broader area of expertise and making them more marketable. For further information about school health education, please refer to the Health Education (https://www.ndsu.edu/hpe/undergraduate_programs/health_education/)website.

CERTIFICATION

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

Option Two: Coaching and Physical Activity Leadership

This option prepares students for careers in coaching, recreation, and youth physical activity programming. The program is aligned with the Society of Health and Physical Educators of America (SHAPE) National Standards for Sports Coaches (https://www.shapeamerica.org/standards/coaching/) and promotes best practices in physical activity settings. Coursework focuses on youth development, injury care and prevention, planning and facilitation of physical activity programming, and instructional strategies for physical activity settings. Students have opportunities to engage in various field experiences prior to the culminating semester-long internship experience . Students must maintain a 2.75 cumulative grade point average in order to graduate.

TECHNOLOGY

Physical education majors at North Dakota State University are taught how to use and apply a variety of technologies and software to analyze physical activity skills and strategies, assess student/athlete progress towards meeting standards and outcomes/goals, and reflect on both their teaching/coaching effectiveness and student/athlete progress.

CAREER OPPORTUNITIES

Graduates in physical education find career opportunities teaching in both public and private educational settings, coaching within the community, athletic programs including college athletics, community sports positions with parks and recreation facilities, and/or local recreation organizations such as the YMCA. If interested in coaching at higher education institutions, students are encouraged to maintain a 3.0 GPA to increase their likelihood of acceptance into graduate school to pursue the necessary master's degree required to coach at this level.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

PHYSICAL EDUCATION TEACHING MAJOR

First Year				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110	3		ENGL 120	3
PSYC 111	3		EDUC 321	3
HPER 110*	3		HPER 217, HNES 100, or HNES 111*	2 or 3
HPER 255*	3		Gen Ed Science/Technology w/ Lab	4
Gen Ed Science/Technology	3		Gen Ed Quantitative Reasoning	3
	15			**15-16**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
COMM 110	3		HPER 353*	3

EDUC 322	3	Gen Ed Science/Technology	3
HPER 211	1	Gen Ed Humanities/Fine Arts & Global Perspectives GE	3
HPER 254*	3	Free Elective	6
Gen Ed Humanities/Fine Arts	3		
Free Elective	3		
Complete Core Academic Skills Exam or access your ACT+ scores			
Apply to the School of Education			
	16		**15**

Third Year			
Fall	**Credits**	**Spring**	**Credits**
HPER 256*	3	EDUC 451*	3
HPER 301**	3	HPER 257*	3
EDUC 489	3	HPER 336**	3
Gen Ed Upper Division Writing	3	HPER 350*	3
Free Elective	3	HPER 367**	3
	15		**15**

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 481 (PE Section)***	3	EDUC 485	1
Free Electives	4	EDUC 487	9
EDUC 486	3	EDUC 488	3
HPER 461*	3		
PSYC 250 or HDFS 230***	3		
Apply for Student Teaching			
Complete PLT (grades K-12) exam			
Complete Subject Area Assessment Exam			
	16		**13**

Total Credits: 120-121

*
Students are required to earn a "B" or better in these courses, but may earn one "C" among the three courses marked with two asterisks (**).

***
Students are required to earn a grade of C or better in course marked with three asterisks (***).

Sample Program Guide - Health Education & Physical Education Double Major

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	3	EDUC 321	3
HPER 110*	3	ENGL 120	3
HPER 255*	3	Gen Ed Science & Tech w/ Lab	4

PSYC 111		3	Gen Ed Quantitative Reasoning		3
Gen Ed Science/Tech		3	Gen Ed Hum/Fine Arts & Cultural Diversity		3
		15			**16**
Second Year					
Fall	**Credits**		**Spring**	**Credits**	
COMM 110		3	HPER 217, HNES 100, or HNES 111*		3
EDUC 322		3	HPER 257*		3
HPER 211		1	HPER 341*		3
HPER 254*		3	HNES 250***		3
HPER 256*		3	PSYC 210***		3
Gen Ed Hum/Fine Arts & Global Perspectives		3	Gen Ed Science & Tech		3
Complete Core Academic Skills Exam or access your ACT+ scores					
		16			**18**
Third Year					
Fall	**Credits**		**Spring**	**Credits**	
PSYC 212***		3	EDUC 489		3
HPER 301**		3	HPER 345*		3
HPER 336**		3	HPER 350*		3
HPER 367**		3	HPER 353*		3
EDUC 451 (PE section)*		3	Gen Ed Upper Division Writing		3
		15			**15**
Fourth Year					
Fall	**Credits**		**Spring**	**Credits**	
EDUC 481 (Health Section)***		3	EDUC 485		1
EDUC 481 (PE Section)***		3	EDUC 487		9
EDUC 486		3	EDUC 488		3
PSYC 250 or HDFS 230**		3			
HPER 461*		3			
Apply for Student Teaching					
Complete PLT (grades K-12) Exam					
Complete Subject Area Assessment Exam					
		15			**13**

Total Credits: 123

*

Students are required to earn a "B" or better in these courses, but may earn one "C" among the three courses marked with two asterisks (**).

***

Students are required to earn a "C" or better in courses marked with three asterisks (***)

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should

utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110		3	ENGL 120	3
HPER 110		3	COMM 110	3
HPER 255*		3	HNES 226	3
HNES 190		3	Gen Ed Science/Technology w/Lab	4
PSYC 111*		3	Gen Ed Quantitative Reasoning	3
		15		**16**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
HDFS 230		3	HDFS 330	3
HNES 250		3	Gen Ed Science/Technology	3
HPER 211		1	Gen Ed Humanities/Fine Arts & Cultural Diversity	3
HPER 217, HNES 100, or HNES 111		3	Free Electives	7
Gen Ed Humanities/Fine Arts & Global Perspectives		3		
Gen Ed Science/Technology		3		
		16		**16**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
HDFS 340		3	HNES 388	3
HPER 301		3	HNES 431	3
HPER 336		3	HPER 349	3
HPER 367		3	Gen Ed Upper Division Writing	3
Program Elective		3	Program Elective	3
		15		**15**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
PSYC 340		3	HNES 485	12
Program Elective		3		
Free Electives		9		
		15		**12**

Total Credits: 120

*
Students are required to earn a "B" or better.

Physical Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**

catalog.ndsu.edu/programs-study/undergraduate/physical-education/#planofstudypemajortext (http://catalog.ndsu.edu/programs-study/undergraduate/physical-education/#planofstudypemajortext)

Major Requirements

Major: Physical Education

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Physical Education Core Requirements		
HPER 110	Introduction to Health and Physical Education	3
HPER 211	Successful Coaching	1
HPER 217	Personal and Community Health	3
HPER 255	Professional Preparation in Middle School Physical Education	3
HPER 301	Motor Learning and Performance	3
HPER 336		

HPER 367	Pedagogy of the Body for K-12	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
Major Option		
Students select either the K-12 Teaching Licensure Option or the Coaching & Physical Activity Leadership Option		51 or 54
Total Credits		**70-73**

K-12 Teacher Licensure Option

Code	Title	Credits
HDFS 230	Life Span Development (May satisfy general education category B) [2]	3
or PSYC 250	Developmental Psychology	
HPER 254	Curriculum, Standards and Assessment in Physical Education	3
HPER 256	Professional Preparation in High School Physical Education	3
HPER 257	Professional Preparation in Elementary School Activities	3
HPER 350	Fitness Education Activities and Materials	3
HPER 353	Adapted Physical Education	3
HPER 461	Administrative and Social Aspects of Physical Education and Athletics	3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment [1]	3
EDUC 481	Classroom Practice Methods of Teaching I: (PE K-12 section) [2]	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		**52**

Coaching and Physical Activity Leadership Option

Code	Title	Credits
HDFS 230	Life Span Development	3
HDFS 330	Child Development	3
HDFS 340	Adolescent Development	3
HNES 190	Introduction to Sport Management	3
HNES 226	Socio-Cultural Dimension in Sport	3
HNES 250	Nutrition Science	3
HPER 349	Advanced Coaching	3
HNES 388	Prevention and Care of Athletic Injuries	3
HNES 431	Sport Law	3
PSYC 340	Psychology in Sport	3
HPER 496	Field Experience	12
Electives:		9
COMM 114	Human Communication	
COMM 212	Interpersonal Communication	
EDUC 322	Educational Psychology	
EDUC 451	Instructional Planning, Methods and Assessment	
EDUC 489	Teaching Students of Diverse Backgrounds	
HDFS 341	Parent-Child Relations	
HNES 304	Sport Promotion and Public Relations	
HPER 353	Adapted Physical Education	
HNES 436	Sport Facility and Event Management	

HNES 473	Anaerobic Exercise Prescription and Advanced Resistance Training Techniques	
SOC 214	Social Interaction	
SOC 235	Cultural Diversity	
HNES 323	Ethics of Sport	
HNES 303	Sport Communication and New Media	
HNES 444	Sport Finance	
HNES 414	Global Perspectives in Sport	
Total Credits		**51**

1

Students must earn a grade of "B" or better for the K-12 Teacher Licensure Option

2

Students must earn a "C" or better for the K-12 Teacher Licensure Option

3

Students may only earn one "C" among these three courses for the K-12 Teacher Licensure Option

4

Students must earn a "B" or better (Both Options)

Degree Requirements and Notes

- K-12 Teacher Licensure Option
  - To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
  - To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.
  - Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
  - See School of Education (https://www.ndsu.edu/education/) for admission requirements.
- Coaching and Physical Activity Leadership Option
  - A GPA of 2.75 or better is required to exit from the program.
  - Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

Physics

Department Information

- **Department Web Site:**
  www.ndsu.edu/physics/ (http://www.ndsu.edu/physics/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/physics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/physics/)

Physics is the most fundamental and exact of the physical sciences. Its laws are basic to deep understanding in all of technology, and in many fields of study, such as astronomy, chemistry, engineering, materials science, photonics, biology, medicine, geology, and environmental science. Physicists often end up in a wide range of leadership positions.

Background Information

The Department of Physics has growing undergraduate and graduate programs. Yet, its size remains comparatively small, allowing personalized interactions between students with all of its 11 faculty members. Not only do students participate in research projects early on, they often become authors in peer-reviewed publications and present their results in the regional and national conferences and workshops. In addition, our students are highly engaged; they regularly participate successfully in the University Physics Competition and contribute actively to various outreach activities.

The Department of Physics has a strong research focus on three fields: materials (especially soft materials), computational physics, and physics education research. While this represents only a small subset of all existing physics fields, our focus makes us competitive and successful on the national level and beyond. Students can choose among a number of curricular options that prepare them for industrial, governmental, and academic careers. The Fargo/Moorhead urban area contains three colleges with a physics program. See https://www.ndsu.edu/onestop/registration/tricollege (https://www.ndsu.edu/onestop/registration/tricollege/) for information about the Tri-College system.

High School Preparation

A prospective physics major is generally expected to have taken physics, chemistry, and mathematics courses. Computer courses can also be useful. Incoming students should normally be ready to start learning calculus. Some of our incoming students have already taken AP courses in physics or mathematics. Note, however, that deficiencies in any of these subjects may be remedied in the freshman or later years at the University.

Curriculum Options

The most popular curricular option in the Department of Physics is the standard physics major. Also popular are our two dual major programs in Physics and Mathematics as well as in Physics and Computer Science. Also, we offer dual majors in Electrical Engineering and Physics, and in Mechanical Engineering and Physics. All these programs allow well-prepared students to complete the requirements for both majors in four years by taking advantage of the close connections between physics, mathematics, computer science, and engineering. In addition, the department offers a physics major with a focus on optical science and engineering. The optical science and engineering option, which is the only regional program of this type, includes an interdisciplinary optics/photonics sequence of courses taught by the Department of Physics and the Department of Electrical and Computer Engineering using a state-of-the-art optics teaching laboratory. Finally, highly qualified students can earn both a Bachelor's and Master's degree in physics by enrolling into the Accelerated Masters program in their junior year.

All of our physics majors (including the dual majors and physics majors with the optical science and engineering option) take introductory courses in classical mechanics, computational physics, electricity and magnetism, optics, thermodynamics, quantum mechanics, and modern physics, as well as selected specialized courses such as photonics, lasers, or condensed matter physics. In addition, physics majors can get involved in research projects with faculty, typically in fields like materials (including bio- and polymer physics), computational physics, and physics education research. A dedicated course allows students to receive credit for their research efforts. Any of our curriculum options prepares students for graduate work in physics or related fields and subsequent employment in industry, government, or academia. Physics graduates have excellent job perspectives because they are widely valued as creative and persistent problem solvers who are often able to step into leadership positions.

Career Opportunities

A great variety of employment opportunities exist for physics majors who wish to pursue careers after obtaining a bachelor's degree. Some find positions in industry or government. Many technical industries seek physics graduates for work in software development, engineering, science and lab technician positions, management and sales. According to the results of the National Association of Colleges and Employers Winter 2024 Salary Survey, physics majors were expected to receive an average starting salary of $75,753.

As technology continues to develop, there will be a need for skilled people to make new discoveries in the basic sciences. Because of this, talented physics majors are encouraged to pursue the doctoral degree. Outstanding doctoral graduates in physics find research and teaching positions in universities or employment in government laboratories and research-oriented industries.

An education in physics is so fundamental that it provides an excellent preparation for graduate education in nearly every technical field, including engineering. Additionally, North Dakota State University graduates in physics have entered medical schools and have studied law. One past graduate received a doctorate in biophysics and now works at the University of Minnesota Medical School; another is at the Mayo Clinic in Rochester, MN. Some of our recent graduates worked on advanced degrees in biomedical engineering, chemical physics, electrical engineering, solid-state physics, meteorology and radiological science. A number of recent graduates have pursued graduate studies at schools such as Cornell University, the University of Minnesota, Carnegie Mellon University, Ohio State University, University of Illinois at Chicago, State University of New York Stony Brook, Rutgers University and Northwestern University.

Financial Aid

Financial aid at NDSU is available in the form of loans, grants, scholarships, and work-study. Students who qualify for federal college work-study may be paid for work on department research projects. Highly qualified students may be hired through the Department of Physics or the College of Arts and Sciences as undergraduate Research Assistants (RA) or Learning Assistants (LA).

Internships

The Cooperative Education Program provides students the opportunity to earn money and gain valuable experience by spending one or more semesters working in industrial or government laboratories. Internship opportunities include Sanford Medical Center in Fargo and NASA. Students may also apply to participate in research projects through the Department of Physics or Research Experience for Undergraduates program at NDSU or other institutions.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
PHYS 171		1	PHYS 251 & 251L	5
MATH 165[1]		4	MATH 129 or 329	3
CHEM 150 & CHEM 160		4	MATH 166	4
ENGL 110 or 120 (based on placement)		3	CHEM 151 & CHEM 161	4
Gen Ed Wellness		2		
		14		**16**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
PHYS 252 & 252L		5	CSCI 161	4
MATH 265		4	PHYS 350	3
CSCI 160		4	MATH 266	3
Free Elective		3	COMM 110	3
			Gen Ed Humanities & Fine Arts/ Global Perspectives	3
		16		**16**
Junior				
Fall	**Credits**		**Spring**	**Credits**
PHYS 355		3	PHYS 370	3
PHYS 360		3	PHYS 361	3
MATH 270 (or MATH 4XX Elective)		3	Gen Ed Upper Division Writing	3
Free elective		3	MATH 4XX Elective	3
Free Elective		3	Gen Ed Humanities & Fine Arts	3
		15		**15**
Senior				
Fall	**Credits**		**Spring**	**Credits**
PHYS 462		3	PHYS 489	2
PHYS 485		3	PHYS 481	3
PHYS 411 & 411L		4	PHYS 486	3
PHYS 488		1	Physics Elective	3
Gen Ed Social and Behavioral Science		3	Gen Ed Social and Behavioral Science/Cultural Diversity	3
		14		**14**

Total Credits: 120

1

Students who place into a math course lower than MATH 165 may need to extend their time to degree completion by up to a year.

Physics

Department Information

- **Department Web Site:**
  www/ndsu.edu/physics/ (http://www/ndsu.edu/physics/)

- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/physics/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/physics/#planofstudytext)

Major Requirements

Major: Physics (Standard & Optical Science and Engineering Options)

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

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Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Physics Major Requirements

A grade of 'C' or better is required for all PHYS and AST prefix courses.

Code	Title	Credits
Major Core Requirements		
PHYS 171	Introductory Projects in Physics	1
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5

PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
PHYS 350	Modern Physics	3
PHYS 355		3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHY 370: Electromagnetic Theory from MSUM)	3
PHYS 370	Introduction to Computational Physics	3
PHYS 411 & 411L	Optics for Scientists & Engineers and Optics for Scientists and Engineers Lab	4
PHYS 462	Thermal and Statistical Physics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
PHYS 488	Senior Project I	1
PHYS 489	Senior Project II	2
CSCI 160	Computer Science I	4
or ECE 173	Introduction to Computing	
MATH 129	Basic Linear Algebra	3
or MATH 329	Intermediate Linear Algebra	
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH Electives - Select 6 credits from the following:		6
MATH 270	Introduction to Abstract Mathematics	
MATH 400 Level		
Select one of the following chemistry sequences (150/160 is recommended):		4
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
Select one of the following chemistry sequences (151/161 recommended):		4
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Option Requirement		
Select either the Standard option or the Optical Science & Engineering option to complete this major (requirements below).		10
Total Credits		**88**

Code	Title	Credits
STANDARD OPTION		
CSCI 161	Computer Science II	4
Physics Electives: Select two courses from the following:		6
PHYS 215	Research For Undergraduates	
PHYS 413	Lasers for Scientists and Engineers	
PHYS 415	Elements of Photonics	
PHYS 481	Materials Physics	
MSUM AST	Astronomy courses (300/400 level) with departmental approval	
PHYS 357	Concordia College Astrophysics	
PHYS 419	Concordia College Introduction to General Relativity	
Total Credits		**10**

Code	Title	Credits
OPTICAL SCIENCE AND ENGINEERING OPTION		
PHYS 413	Lasers for Scientists and Engineers	3
PHYS 415	Elements of Photonics	3
EE 206	Circuit Analysis I	4
Total Credits		**10**

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Minor Requirements

Minor: Physics

Required Credits: 19

Code	Title	Credits
Required Courses		
PHYS 251	University Physics I	4
PHYS 252	University Physics II	4
PHYS 252L	University Physics II Laboratory	1
PHYS 350	Modern Physics	3
Electives: Select 7 credits from the following:		7
PHYS 171	Introductory Projects in Physics	
PHYS 251L	University Physics I Laboratory	
PHYS 215	Research For Undergraduates	
Any 300-400 level Physics course		
ME 221 and ME 222 may be substituted for PHYS 251 and PHYS 251L		
Total Credits		**19**

Minor Requirements and Notes

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

Physics Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/physics-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/physics-education/)

Physics is the most fundamental and exact of the physical sciences. Its laws are basic to deep understanding in all of technology, and in many fields of study, such as astronomy, chemistry, engineering, materials science, photonics, biology, medicine, geology, and environmental science. Teaching physics in secondary schools requires deep knowledge of (a) science content, (b) current theories of adolescent development, and (c) current best practices in instruction. Accordingly, the physics education major combines coursework in physics and related sciences with professional education courses on teaching and learning.

The Program

Candidates in physics education are prepared to teach students in grades 5-12 with skill and confidence. The program is designed to develop science content knowledge as well as proficiency in a range of science-related skills and laboratory practices. Our professional education courses prepare teacher candidates to incorporate active learning strategies, create effective methods for assessment, and adjust instruction to accommodate diverse learners. Teacher candidates also apply their knowledge and build their teaching skills during multiple clinical experiences in local schools.

Professional Education Courses

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

Student Teaching

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

Student Advisement

Physics education teacher candidates are assigned to academic advisors who work closely with them to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to meet with their advisor at least once every semester, as well as whenever needed.

Licensure

Upon completing this program, teacher candidates are eligible for teacher licensure in physics in most states. Teacher candidates who take the Praxis Subject Assessment exam for Physics will be licensed to teach Physics and related courses, as well as middle school sciences. Teacher candidates who choose to take the Praxis Subject Assessment exam for General Science will be licensed to teach all areas of middle school and high school science. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPB).

Career Opportunities

Science teachers are in high demand across the country, so our graduates usually obtain full-time employment in school districts shortly after graduation. Notably, by completing 6 additional credit hours, physics education majors can become licensed to teach mathematics as well. See your academic advisor for specific course requirements.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	3	CHEM 122 & 122L (or CHEM 151 & CHEM 161)	4
CHEM 121 & 121L (or CHEM 150 & CHEM 160)	4	MATH 129 or 329	3
COMM 110	3	MATH 166	4
MATH 165[1]	4	PHYS 251 & 251L	5
PHYS 171	1	ENGL 120	3
	15		**19**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 321	3	EDUC 322	3
GEOL 105 & 105L (OR GEOL 106 & GEOL 106L)	4	MATH 266	3
MATH 265	4	PHYS 110	3
PHYS 252 & 252L	5	PHYS 350	3

Complete Core Academic Skills Exam or access your ACT+ scores		Gen Ed Social & Beh Sci/Cultural Diversity	3
		Apply to the School of Education	
	16		**15**

Third Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 150 & 150L	4	EDUC 481	3
EDUC 451	3	EDUC 486	3
ENGL 324	3	PHYS 361	3
PHYS 355	3	Gen Ed Social & Behavioral Science	3
Gen Ed Humanities & Fine Arts	3	Gen Ed Wellness	2
	16		**14**

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 475	2	EDUC 485	1
EDUC 482	3	EDUC 487	9
EDUC 489	3	EDUC 488	3
PHYS 411 & 411L	4		
PHYS 462	3		
Gen Ed Humanities & Fine Arts	3		
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
	18		**13**

Total Credits: 126

1

Students who place into a math course lower than MATH 165 may need to extend their time to degree completion by up to a year.

Physics Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/physics-education/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/physics-education/#planofstudytext)

Major Requirements

Major: Physics Education

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Teaching Specialty Requirements		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
Pick an introductory chemistry sequence (A or B):		8
Sequence A:		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Sequence B:		
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
ENGL 324	Writing in the Sciences	3
Select one of the following geology courses and lab:		4

GEOL 105 & 105L	Physical Geology and Physical Geology Lab	
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	
Select one of the following algebra courses:		3
MATH 129	Basic Linear Algebra	
MATH 329	Intermediate Linear Algebra	
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 251 & 251L	University Physics I and University Physics I Laboratory	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
PHYS 350	Modern Physics	3
PHYS 355	(or PHYS 330: Intermediate Mechanics (MSUM))	3
PHYS 361	Electromagnetic Theory (or PHYS370: Electromagnetic Theory (MSUM))	3
PHYS 411 & 411L	Optics for Scientists & Engineers and Optics for Scientists and Engineers Lab	4
PHYS 462	Thermal and Statistical Physics	3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Science)	3
EDUC 482	Classroom Practice/Methods of Teaching II: (Science)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		**101**

Degree Requirements and Notes

- See School of Education (https://www.ndsu.edu/education/) for admission requirements.
- Courses taken P/F may not be used to satisfy any requirements.
- A grade of 'C' or better is required in all professional education courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.
- Adding Mathematics as an additional teacher licensure area can be accomplished with 6 additional credit hours. See your academic advisor for details.

Political Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/politicalscience/ (http://www.ndsu.edu/politicalscience/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Official Program Curriculum:**

catalog.ndsu.edu/undergraduate/program-curriculum/political-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/political-science/)

Political Science is the study of politics, policy, and social forces from domestic, international, and comparative perspectives. It is the ongoing examination of social behavior, public and private institutions, international relations, domestic and international law, public policy, and the many varieties of political ideologies. Political Science coursework provides students with an understanding of how government affects their everyday lives while simultaneously developing their communication, critical thinking, and analytic skills.

THE PROGRAM

Political Science prepares you for careers in public service, the legal professions, non-profit organizations, and the private sector. We offer:

- Flexible course loads: Students in our major can focus on those aspects of politics and policy that interests them most
- In-demand skills: Our programs build such skills as written and spoken communications, data analysis, policy evaluation, and legal reasoning.
- Hands-on learning: Our internship program (https://www.ndsu.edu/politicalscience/careers/political_science_internships/), undergraduate research opportunities, and study abroad programs provide students with multiple ways of acquiring skills and knowledge outside the classroom.
- Community: Student organizations such as the Pre-Law Club (https://www.ndsu.edu/politicalscience/student_experience/pre_law_club/) and Pi Sigma Alpha (https://www.ndsu.edu/politicalscience/student_experience/pi_sigma_alpha/) help students to connect with peers, build professional networks, and prepare for post-college life.

Experience

Political science offers annual study abroad experiences with recent visits to the British Parliament, the Hague, Italy, and the European Commission. Political science internships provide real-world experiences in government, political parties and campaigns, legal affairs, and public policy. The Upper Midwest Center on Public Policy (https://www.ndsu.edu/centers/publicpolicy/) offers students opportunities to conduct research on politics and public policy.

Career Opportunities

Careers for political science graduates can be found in such areas as law, policy analysis, civil service, interest groups and associations, program administration, local and state government, non-profit organizations, diplomatic service, communications, business, and other critical fields.

Many political science students go on to attend law school and pursue a legal profession. NDSU students have graduated from such law schools as the University of North Dakota, the University of Minnesota, the University of Michigan, the University of Washington, Northwestern University, Duke, and George Washington University. Other students have pursued graduate studies in public administration and public policy and gone on to careers in public administration, regional planning, non-profit management, consulting, and academia.

Scholarships

There are a number of scholarships available to students within the Political Science program. Visit the department website (https://www.ndsu.edu/politicalscience/) for information.

Extra-Curricular Activities

The Department of Political Science & Public Policy works closely with the Pre-Law Club, a student organization for students interested in attending law school. The Club holds regular events, invites lawyers and law school administrators to discuss careers, and provides information about law schools, entrance examinations, and career opportunities.

Accelerated mpp

The Department of Political Science & Public Policy is proud to offer an accelerated Master of Public Policy (https://www.ndsu.edu/politicalscience/academics/graduate_program/#:~:text=Master%20of%20Public%20Policy&text=NDSUs%20Master%20of%20Public%20Policy,policy%20design%20and%20program%20evaluation) (MPP) option that allows students to complete a BA/BS in Political Science and an MPP in as little as 5 years.

The Faculty

Faculty in the Department of Political Science and Public Policy have expertise in such areas as state and local governance, law and judicial politics, crime-related policy, international law, the modern digital society, research methodology, and policy analysis. They provide a practice-informed education for NDSU students. We encourage students who want to learn more about the Pre-Law Minor to reach out via email or schedule an appointment using Bison Advise (https://career-advising.ndsu.edu/about-bison-advise/).

Faculty members include:

Dr. Thomas Ambrosio, Professor, Ph.D., 2000, University of Virginia.

Dr. Nicholas Bauroth, Professor, Ph.D., 2003, Loyola University Chicago

Dr. Sarah Boonstoppel, Assistant Professor, Ph.D., 2014, University of Maryland

Dr. Steven Briggs, Associate Professor, Ph.D., 2007, University of Nebraska at Omaha.

Dr. Elizabeth Carlson, Associate Professor, Ph.D., 2011, University of California Los Angeles

Dr. Kjersten Nelson, Professor, Ph.D., 2009, University of Minnesota.

Dr. Daniel Pemstein, Professor, Ph.D., 2010, University of Illinois.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
POLS 110 or 115	3	POLS 220 or 225	3
MATH 104 or 103	3	ENGL 120	3
ENGL 110	3	Gen Ed Hum & FA/Cult Div	3
COMM 110	3	Gen Ed Science &Tech	3
Gen Ed Hum & Fine Arts/Glob Persp	3	Free Elective	3
	15		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
POLS 240	3	POLS 325	3
STAT 330	3	Gen Ed Wellness	3
Gen Ed Science & Tech w/ Lab	4	Free Electives	9
Free Elective	6		
	16		**15**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
POLS 300-400 Area Elective[1]	3	POLS 470	3
POLS 300-400 Area Elective[1]	3	POLS 300-400 Area Elective[1]	3
Gen Ed Upper Division Writing	3	POLS 300-400 Area Elective[1]	3
Free Electives	6	Gen Ed Science & Tech	3
		Free Electives	3
	15		**15**
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
POLS Major Elective	3	POLS 300-400 Area Elective[1]	3
POLS Major Elective	3	POLS Major Elective	3
Free Electives	10	Free Electives	7
	16		**13**

Total Credits: 120

1

Select a minimum of five courses from at least three of the four areas (Areas 1-4)

Political Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/politicalscience/ (http://www.ndsu.edu/politicalscience/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/political-science/#planofstudystandardtext (http://catalog.ndsu.edu/programs-study/undergraduate/political-science/#planofstudystandardtext)

Major Requirements

Major: Political Science

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Core Requirements		
POLS 110	Introduction to Political Science (May satisfy general education category B)	3
or POLS 115	American Government	
POLS 220	International Politics	3
or POLS 225	Comparative Politics	
POLS 240	Political Ideologies	3
POLS 325	Applied Research Methods	3
POLS 470	Quantitative Methods for Political Science and Public Policy	3
Select a minimum of five courses from at least three of the four areas listed below (Area 1-4):		15
Area 1:		
POLS 351	Women and Politics	
POLS 420	Political Behavior-Executive-Legislative Process	
POLS 421	Political Behavior-Political Parties	
POLS 422	State and Local Politics	
POLS 423	Public Policy Analysis	
POLS 424	Inequality and Public Policy	
Area 2:		
POLS 424	Inequality and Public Policy	
POLS 430	Constitutional Law-Civil Liberties	
POLS 431	Constitutional Law-Criminal Justice	
POLS 432	Crime and Public Policy	
POLS 433	Law and Public Policy	
POLS 447	U.S. National Security Law	
Area 3:		
POLS 442	Global Policy Issues	
POLS 444	International Law	
POLS 445	Ethnic Conflicts	
POLS 453	Environmental Policy and Politics	
POLS 446	International Criminal Law	
POLS 447	U.S. National Security 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	
POLS 454	Comparative Democratic Institutions	
Political Science Electives		9
Any POLS prefix class (except POLS 397) and no more than 3 credits of POLS 494 and POLS 496.		
Total Credits		**39**

Degree Notes:

- An optional accelerated program in the B.S./B.A. in Political Science degree and the Masters in Public Policy (MPP) is available.
  - Students may apply for admission to the accelerated undergraduate political science program after completing a minimum of 60 undergraduate credits.
  - Students must have a minimum 3.5 cumulative GPA for admission to the MPP graduate program. The GRE is not required for admission to the MPP program in this accelerated option.
  - Students admitted to the MPP program must complete a ***Accelerated Degree Program Declaration Form*** upon admission.
  - Students admitted in the accelerated program may count up to 15 graduate credits toward the undergraduate degree. These 15 credits must come from 600 and 700 level classes that fulfill requirements in the MPP program.

Code	Title	Credits
POLS 623	Public Policy Analysis (Use for Area I)	3
POLS 710	Global Public Policy (Use for Area IV)	3
POLS 705	Policy Design and Evaluation (Use for POLS elective)	3
POLS 724	Public Budgeting and Finance (Use for Area I)	3
POLS 726	Harm Reduction for Policymakers (Use for POLS elective)	3
POLS 670	Quantitative Methods for Political Science and Public Policy (Use for POLS elective)	3

Minor Requirements

Minor: Political Science

Required Credits: 21

Code	Title	Credits
Required Courses		
POLS 110	Introduction to Political Science	3
or POLS 115	American Government	
POLS 220	International Politics	3
or POLS 225	Comparative Politics	
POLS 240	Political Ideologies	3
Electives		**12**
Any POLS prefix classes with no more than 3 credits of POLS 494 and POLS 496. Minimum of 6 credits must be at or above 300 level.		
Total Credits		**21**

Precision Agriculture Technology & Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/aben/ (http://www.ndsu.edu/aben/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/precision-agriculture/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/precision-agriculture/)

The Program

The Precision Agricultural Technology & Management (PATM) program combines an understanding of farming, agricultural economics, business and sciences, managerial and technical skills. This understanding of agricultural science, technology, and related practices, including unmanned aerial systems (drones), remote sensing, artificial intelligence, machine learning, sensors, robotic applications, cloud computing, big data management, and site-specific resources management is a crucial component of modern agriculture. Students will learn how to use the applications that are commonly needed to produce and process food, feed, fiber and fuel, as well as how to market, conduct sales and distribute agricultural products and services. Graduates enter the job market ready to meet the needs of their employer and clients that need help managing precision agricultural technology.

The Precision Agricultural Technology & Management (PATM) program in the Department of Agricultural and Biosystems Engineering has two emphasis areas:

- Precision Agriculture (PAG)
- Agricultural Technology (ATM)

Both emphasis areas lead to a Bachelor of Science degree in Precision Agricultural Technology and Management.

internships

The curriculum requires at least one internship, but students are highly encouraged to take advantage of as many internship opportunities as they wish, especially co-operative education experiences (paid internships). These are great opportunities for students to gain hands-on experience working with precision agriculture technologies. In addition, internship experiences allow students to make more informed decisions regarding their major, to make better selection of elective courses, and open doors for employment upon graduation.

Career opportunities

Opportunities for PATM graduates are many and diverse. Graduates may, for example, be employed by companies providing equipment and technical services related to precision agriculture, such as Titan Machinery, RDO Equipment, FarmersEdge, InteligentAg, and John Deere. The adoption of aerial remote sensing and artificial intelligence is on the rise in both private and public sectors, which creates new employment opportunities for PAG graduates. In addition, one always can start his/her own business as a private consultant on precision agriculture. Graduates in our Agriculture Technology option find successes with companies such as Pioneer, ADM, RDO Equipment, and Titan Machinery as Business Managers, Elevator Majors, and Agronomist.

Scholarships

Several scholarships are available through the department. These scholarships range from $500 to $4,500. Students also may be eligible for scholarships from the College of Agriculture, Food Systems, and Natural Resources.

A well equipped teaching facility

The PATM degree program is housed in Ladd Hall and the NDSU Pilot Plant West which includes offices, classrooms and laboratories. Laboratories are furnished with equipment typical of that used in industry and research, such as personal computers with software used to manipulate and to write prescriptions to field equipment, several models of unmanned aerial systems (drones), a variety of sensors/cameras (RGB, multispectral, and hyperspectral) mounted to drones and to benches in the lab, tractors, engines, surveying equipment, etc. Faculty expertise varies across a wide and diverse range of specialties related to agricultural and biological systems.

Common Job Outcomes - PAG

- Drone Operator
- Engineering Technician
- Agricultural Crop Consultant
- Technical Support Specialist
- Sales Manager

Common Job Outcomes - ATM

- Farm Owner/Manager
- Plant Manager
- Agricultural Sales
- Grain Cooperative Manager
- Grain Merchandiser
- Engineering Technician
- Irrigation Manager
- Production Supervisor
- Agricultural Crop Consultant
- Technical Support Specialist
- Sales Manager
- Farm Credit Analyst

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Precision Agriculture Sample Program Guide

Freshman			
Fall	**Credits**	**Spring**	**Credits**
PAG 115	2	CSCI 114 or TL 116	3
PAG 115L	1	ENGL 120	3
ENGL 110	3	PHYS 120	3
COMM 110	3	SOIL 210 or ANSC 223	3
MATH 103	3	Program Elective	3

PLSC 110 or ANSC 114		3					
		15		**15**			
Sophomore							
Fall	**Credits**		**Spring**	**Credits**		**Summer**	**Credits**
ASM 225		3	PAG 315	3		PAG 496:: Field Exp./ Internship	1
CHEM 121		3	PAG 348	1			
CHEM 121L or PHYS 120L		1	SOIL 322 or ANSC 240	3			
PAG 215		3	PLSC 225 or ANSC 220	3			
GEOG 455		4	Gen Ed Soc & Behav Sci	3			
			Program Elective	3			
		14		**16**			**1**
Junior							
Fall	**Credits**		**Spring**	**Credits**			
ASM 354		3	PAG 454	3			
AGEC 242		3	ASM 429	3			
PPTH 324 or ANSC 218		3	ENGL 320, 321, 324, or 459	3			
Gen Ed Hum & FA/Cult Div		3	Gen Ed Wellness	2			
Program Elective		3	Program Elective	3			
		15		**14**			
Senior							
Fall	**Credits**		**Spring**	**Credits**			
ASM 378		3	PAG 475	2			
STAT 330		3	Gen Ed Soc & Behav Sci	3			
Gen Ed Hum & FA/Glob Persp		3	Free Elective	10			
Program Elective		6					
		15		**15**			

Total Credits: 120

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Agriculture Technology Sample Program Guide

Freshman				
Fall	**Credits**	**Spring**	**Credits**	
ASM 115	3	ACCT 102	3	
ASM 125	3	COMM 110	3	
PAG 115	2	CSCI 114 or TL 116	3	
ENGL 110	3	ENGL 120	3	
MATH 103	3	Gen Ed Hum & Fine Arts/Cult Div	3	
	14		**15**	

Sophomore				
Fall	**Credits**		**Spring**	**Credits**
ASM 225		3	ASM 264	3
AGEC 242		3	ASM 264L	1
ECON 201		3	ASM 348	1
PHYS 120		3	ECON 202	3
PHYS 120L or CHEM 121L		1	Program Elective	3
Program Elective		3	Free Elective	4
		16		**15**
Junior				
Fall	**Credits**		**Spring**	**Credits**
ASM 323		3	ASM 373	3
CHEM 121		3	ASM 374	1
STAT 330		3	ENGL 320, 321, 324, or 459	3
Gen Ed Wellness		2	Program Elective	3
Program Elective		3	Free Elective	4
		14		**14**
Senior				
Fall	**Credits**		**Spring**	**Credits**
ASM 354		3	ASM 429	3
ASM 378		3	ASM 475	2
Gen Ed Hum & Fine Arts		3	Program Elective	9
Program Elective		6	Free Elective	3
		15		**17**

Total Credits: 120

Precision Agriculture Technology & Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/aben/ (http://www.ndsu.edu/aben/)
- **Credential Offered:**
  B.S.
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/precision-agriculture/ (http://catalog.ndsu.edu/programs-study/undergraduate/precision-agriculture/)

Major Requirements

Major: Precision Agriculture Technology & Management

Degree Type: Bachelor of Science (B.S.)
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Precision Agriculture Technology & Management Major

Code	Title	Credits
Core Requirements		
AGEC 242	Introduction to Agricultural Management	3
ASM 225	Computer Applications in Agricultural Systems Management	3
ASM 354	Electricity and Electronic Applications	3
ASM 348	Agricultural Technology Exposition	1
or PAG 348	Agricultural Technology Exposition	
ASM 378	Machinery Principles and Management	3
ASM 475	Management of Agricultural Systems (Capstone)	2
or PAG 475	Precision Ag Systems Capstone	
CSCI 114	Computer Applications	3
or TL 116	Business Software Applications	
CHEM 121	General Chemistry I	3
MATH 103	College Algebra	3
PAG 115	Introduction to Precision Agriculture	2
PHYS 120	Fundamentals of Physics	3
PHYS 120L	Fundamentals of Physics Laboratory	1
or CHEM 121L	General Chemistry I Laboratory	
STAT 330	Introductory Statistics	3
Option Requirement		

Select one option to complete this major: Precision Agriculture or Agricultural Technology	51 or 56
Total Credits	**84-89**

Precision agriculture option

Code	Title	Credits
Precision Ag Option [1]		
PAG 115L	Introduction to Precision Agriculture Lab	1
PAG 215	Mapping of Precision Ag Data	3
PAG 315	Electronic Systems in Precision Ag	3
PAG 454	Applications of Precision Agriculture	3
PAG 496	Field Experience/Practicum (Internship)	1
GEOG 455	Introduction to Geographic Information Systems	4
PLSC 110	World Food Crops	3
or ANSC 114	Introduction to Animal Sciences	
PPTH 324	Introductory Plant Pathology	3
or ANSC 218	Anatomy and Physiology of Domestic Animals	
PLSC 225	Principles of Crop Production	3
or ANSC 220	Livestock Production	
SOIL 210	Introduction to Soil Science	3
or ANSC 223	Introduction to Animal Nutrition	
SOIL 322	Soil Fertility and Fertilizers	3
or ANSC 240	Meat Animal Evaluation and Marketing	
Option Electives		
Select 21 credits from the Program Option Electives list below.		21
Total Credits		**51**

Agricultural Technology Option

Code	Title	Credits
Agricultural Technology Option [1]		
ASM 115	Fundamentals of Agricultural Systems Management	3
ASM 125	Fabrication & Construction Technology	3
ASM 264	Natural Resource Management Systems	3
ASM 264L	Natural Resource Management Systems Laboratory	1
ASM 323	Post-Harvest Technology	3
ASM 373	Tractors & Power Units	3
ASM 374	Power Units Laboratory	1
ASM 429	Hydraulic Power Principles and Applications	3
ACCT 102	Fundamentals of Accounting	3
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
Option Electives		
Select 27 credits from the Program Option Electives list below.		27
Total Credits		**56**

Program OPTION ELECTIVES

Code	Title	Credits
Please select the appropriate number of elective credits for your option from the list below. [2]		
ACCT 201	Elements of Accounting II	3
AGEC 244	Agricultural Marketing	3
AGEC 246	Introduction to Agricultural Finance	3
ANSC 114	Introduction to Animal Sciences	3

ANSC 218	Anatomy and Physiology of Domestic Animals	3
ANSC 220	Livestock Production	3
ANSC 232	Dairy Cattle Evaluation	2
ANSC 240	Meat Animal Evaluation and Marketing	3
ANSC 323	Fundamentals of Nutrition	3
ANSC 330	Competitive Meat Grading and Evaluation	2
ANSC 331	Competitive Livestock Evaluation	2
ANSC 357	Animal Genetics	3
ANSC 463	Physiology of Reproduction	3
ASM 115	Fundamentals of Agricultural Systems Management	3
ASM 125	Fabrication & Construction Technology	3
ASM 234	3D Printing and Manufacturing	2
ASM 264	Natural Resource Management Systems	3
ASM 264L	Natural Resource Management Systems Laboratory	1
ASM 373	Tractors & Power Units	3
ASM 374	Power Units Laboratory	1
ASM 429	Hydraulic Power Principles and Applications	3
BIOL 150	General Biology I	3
BIOL 150L	General Biology I Laboratory	1
BUSN 340	International Business	3
BUSN 487	Managerial Economics	3
COMM 212	Interpersonal Communication	3
COMM 216	Intercultural Communication	3
COMM 308	Business and Professional Speaking	3
CSCI 479	Introduction to Data Mining	3
ECON 105	Elements of Economics	3
ECON 341	Intermediate Microeconomics	3
ECON 343	Intermediate Macroeconomics	3
ENT 210	Insects, Humans and the Environment	3
ENT 350	General Entomology	3
ENT 470	Insect Ecology	3
FIN 320	Principles of Finance	3
GEOG 105	Fundamentals of Geographic Information Systems	3
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
MRKT 320	Foundations of Marketing	3
ME 311	Introduction To Aviation	3
ME 312	Introduction to Flight	2
ME 313	Commercial Instrument Ground School	3
NRM 452	Managing Natural and Rangeland Resources using GIS	3
PLSC 110	World Food Crops	3
PLSC 215	Weed Identification	1
PLSC 225	Principles of Crop Production	3
PLSC 315	Genetics	3
PLSC 315L	Genetics Laboratory	1
PLSC 320	Integrated Forage and Cover Crops Production Management and Ecosystem Services	3
PLSC 323	Principles of Weed Science	3
PAG 115L	Introduction to Precision Agriculture Lab	1

PAG 215	Mapping of Precision Ag Data	3
PAG 315	Electronic Systems in Precision Ag	3
PAG 454	Applications of Precision Agriculture	3
PPTH 324	Introductory Plant Pathology	3
PPTH 454	Diseases Of Field and Forage Crops	3
SOIL 210	Introduction to Soil Science	3
SOIL 217	Introduction to Meteorology & Climatology	3
SOIL 322	Soil Fertility and Fertilizers	3
SOIL 351	Soil Ecology	3
SOIL 410	Soils and Land Use	3
SOIL 433	Soil Ecohydrology and Physics	3
SOIL 444	Soil Genesis and Survey	3
SOIL 447	Microclimatology	3
SOIL 465	Soil And Plant Analysis	3

1

Courses required in either option may be used as electives in the other option.

2

In consultation with your advisor, courses not appearing on the list that are intended to be used in this area require a substitution form to be submitted to the Office of Registration and Records by the student's advisor during the term in which the student completes the course.

Minor Requirements

Minor: Precision Agriculture

Required Credits: 17

Code	Title	Credits
Required Courses		
PAG 115	Introduction to Precision Agriculture	2
PAG 215	Mapping of Precision Ag Data	3
PAG 454	Applications of Precision Agriculture	3
GEOG 105	Fundamentals of Geographic Information Systems	3
Elective Courses - Select 6 credits from the following:		**6**
ABEN 358	Electric Energy Application in Agriculture	
ABEN 377	Numerical Modeling in Agricultural and Biosystems Engineering	
ABEN 444	Transport Processes	
ABEN 452	Bioenvironmental Systems Design	
ABEN 456	Biobased Energy	
ABEN 464	Resource Conservation and Irrigation Engineering	
ABEN 473	Agricultural Power	
ABEN 478	Machinery Analysis & Design	
ABEN 479	Fluid Power Systems Design	
ABEN 482	Instrumentation & Measurements	
AGEC 244	Agricultural Marketing	
AGEC 246	Introduction to Agricultural Finance	
AGEC 342	Farm and Agribusiness Management II	
AGEC 350	Agrisales	
ANSC 114	Introduction to Animal Sciences	
ASM 264	Natural Resource Management Systems	
ASM 354	Electricity and Electronic Applications	
ASM 378	Machinery Principles and Management	
ASM 429	Hydraulic Power Principles and Applications	
BIOL 150	General Biology I	
BIOL 150L	General Biology I Laboratory	

CSCI 479	Introduction to Data Mining
GEOG 455	Introduction to Geographic Information Systems
GEOG 456	Advanced Geographic Information Systems
GEOG 470	Remote Sensing
GEOG 480	Geographic Information Systems Pattern Analysis and Modeling
ME 311	Introduction To Aviation
ME 312	Introduction to Flight
ME 313	Commercial Instrument Ground School
PAG 115L	Introduction to Precision Agriculture Lab
PAG 315	Electronic Systems in Precision Ag
PAG 455	Applications of Big Data in Precision Agriculture
PAG 475	Precision Ag Systems Capstone
PLSC 225	Principles of Crop Production
NRM 453	Rangeland Resources Watershed Management
SOIL 217	Introduction to Meteorology & Climatology
SOIL 322	Soil Fertility and Fertilizers
Total Credits	**17**

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.

Pre-Law

Department Information

- **Department Web Site:**
  www.ndsu.edu/politicalscience/ (http://www.ndsu.edu/politicalscience/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/pre-law/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/pre-law/)

The Pre-Law Minor provides students with an understanding of the American judicial system, US Constitutional law, international law, ethics, and national security issues. The interdisciplinary coursework promotes critical thinking, rigorous analysis, effective oral and written communications, and other skills necessary to succeed in law school and beyond.

The Pre-Law Minor is open to all majors.

EXTRA-CURRICULAR ACTIVITIES

Students interested in a law career are urged to join the Pre-Law Club. The Pre-Law Club is a student organization at NDSU that provides information about law schools, entrance examinations, and career opportunities. The Pre-Law Club organizes Law School Admission Test (LSAT) preparation and practice events, meetings with prominent attorneys and jurists, and field trips to courts and law schools in the region. It's also a great opportunity to socialize with other students who are preparing for law school.

THE FACULTY

Faculty in the Department of Political Science and Public Policy have expertise in such areas as state and local governance, law and judicial politics, crime-related policy, international law, the modern digital society, research methodology, and policy analysis. They provide a practice-informed education for NDSU students. We encourage students who want to learn more about the Pre-Law Minor to reach out via email or schedule an appointment using Bison Advise (https://career-advising.ndsu.edu/bisonadvise/).

Pre-Law

Department Information

- **Department Web Site:**
  www.ndsu.edu/politicalscience/ (http://www.ndsu.edu/politicalscience/)
- **Credential Offered:**

Minor

- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/pre-law/ (http://catalog.ndsu.edu/programs-study/undergraduate/pre-law/)

Minor Requirements

Minor: Pre-Law

Required Credits: 21

Code	Title	Credits
Core Courses		
POLS 230	Judicial Process	3
or POLS 231	Law and Society	
COMM 220	Persuasion	3
or COMM 216	Intercultural Communication	
Case Law Courses		
Choose 2 classes from the following:		6
POLS 430	Constitutional Law-Civil Liberties	
POLS 431	Constitutional Law-Criminal Justice	
POLS 444	International Law	
POLS 446	International Criminal Law	
POLS 447	U.S. National Security Law	
Additional Law-Related Courses		
Choose 3 classes from the following-at least one must be POLS 400 level:		9
CJ 201	Introduction to Criminal Justice	
CJ 230	Criminology	
CJ 330	Criminal Law and Procedure	
CJ 460	Criminal Court System	
COMM 431	Communication Ethics and Law	
HIST 434	Environmental History	
PHIL 257	Traditional Logic	
PHIL 475	Philosophy of Law	
POLS 230	Judicial Process *	
POLS 231	Law and Society *	
POLS 430	Constitutional Law-Civil Liberties *	
POLS 431	Constitutional Law-Criminal Justice *	
POLS 432	Crime and Public Policy *	
POLS 433	Law and Public Policy *	
POLS 444	International Law *	
POLS 446	International Criminal Law *	
POLS 447	U.S. National Security Law *	
PSYC 370	Forensic Psychology	
Total Credits		**21**

*****
Can take as an elective if not used in the core or in the case law area.

Program Notes:

- All course pre-requisites apply.
- Political Science Majors: Courses completed for this minor cannot be double-counted with the Political Science major.

Private Enterprise

Department Information

- **Department Web Site:**
  www.ndsu.edu/agecon/ (http://www.ndsu.edu/agecon/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/private-enterprise/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/private-enterprise/)

The private enterprise certificate introduces students to the fundamentals of business and it gives students an appreciation for the differences between different economic systems (e.g. socialism and capitalism) and their implications. The certificate also gives students an appreciation for the positive role that entrepreneurs and businesses can play in society, and engages students in discussion and critical thinking surrounding important societal issues.

Private Enterprise

Department Information

- **Department Web Site:**
  www.ndsu.edu/agriculture/academics/academic-units/agribusiness-and-applied-economics (http://www.ndsu.edu/agriculture/academics/academic-units/agribusiness-and-applied-economics/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/programs-study/undergraduate/private-enterprise/ (http://catalog.ndsu.edu/programs-study/undergraduate/private-enterprise/)

Certificate Requirements

Certificate: Private Enterprise

Required Credits: 9

Code	Title	Credits
Select one from the following:		3
BUSN 280	Introduction To Business	
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	
ECON 205	Market Values	3
BUSN 491	Seminar (Take 3 times)	3
Total Credits		**9**

Professional Ethics

Department Information

- **Department Web Site:**
  ndsu.edu/history/ (http://ndsu.edu/history/)
- **Credential Offered:**
  Minor; UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/professional-ethics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/professional-ethics/)

Professional Ethics is a high demand area, especially if combined with compliance training. Many different professions require annual ethics training, passing ethics exams to certify professionals, and compliance with state and federal laws affecting human participant research, animal research, information, engineering, science, technology, etc.

Recognized education in Professional Ethics is a wise investment for students to make. It gives them an advantage with future employers, makes them more able to act ethically in their professions and personal lives, and provides them the skills to be ethics leaders for their employers, business community, and public communities.

Professional Ethics

Department Information

- **Department Web Site:**
  www.ndsu.edu/schoolofhumanities/ (http://www.ndsu.edu/schoolofhumanities/)
- **Credential Offered:**
  Minor; UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/programs-study/professional-ethics/ (http://catalog.ndsu.edu/programs-study/professional-ethics/)

Certificate Requirements

Certificate: Professional Ethics

Required Credits: 9

Code	Title	Credits
Ethical Theory and Application - select one course from the following:		3
PHIL 111	Professional Responsibility and Ethics	
PHIL 210	Ethics	
PHIL 215	Contemporary Moral Issues	
Critical Reasoning - select one course from the following:		3
PHIL 157	Critical Thinking and Informal Logic	
PHIL 257	Traditional Logic	
PHIL 370		
Applied Ethics in the Profession - select one course from the following: *		3
PHIL 216	Business Ethics	
PHIL 225	Environmental Ethics	
PHIL 327	Ethics, Engineering, and Technology	
PHIL 475	Philosophy of Law	
Total Credits		**9**

*
With philosophy program approval, an alternative ethics course taught outside the philosophy program, such as those in taught in nursing or communications, can be substituted. A substitution form will need to be submitted to the Office of Registration of Registration signed by the philosophy program coordinator for approval.

Minor Requirements

Minor: Professional Ethics

Required Credits: 18

Code	Title	Credits
PHIL 111	Professional Responsibility and Ethics	3
PHIL 210	Ethics	3
or PHIL 215	Contemporary Moral Issues	
Select one course from the following:		3
PHIL 101	Introduction to Philosophy	
PHIL 157	Critical Thinking and Informal Logic	
PHIL 257	Traditional Logic	
Professional Ethics Application - Select 3 courses from the following: *		9
PHIL 216	Business Ethics	
PHIL 225	Environmental Ethics	
PHIL 327	Ethics, Engineering, and Technology	

PHIL 475	Philosophy of Law	
Total Credits		**18**

*

With philosophy program approval, an alternative ethics course taught outside the philosophy program, such as those in taught in nursing or communications, can be substituted. A substitution form will need to be submitted to the Office of Registration of Registration signed by the philosophy program coordinator for approval.

Professional Selling

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/professional-selling/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/professional-selling/)

The certificate or minor 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.

The certificate and minor in Professional Selling is powered by the center for Professional Selling and Sales Technologies and enhance students' preparedness for careers in sales, business development, and marketing. The certificate and minor are open to students of all majors and aim to enhance the professional skills of students regardless of majors.

Students declare a minor or certificate by completing the minor change form. Please speak with a College of Business professional advisor for assistance or to answer any questions.

Professional Selling

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/professional-selling/ (http://catalog.ndsu.edu/programs-study/undergraduate/professional-selling/)

Certificate Requirements

Certificate: Professional Selling

Required Credits: 12

Code	Title	Credits
Requirements		
MRKT 320	Foundations of Marketing	3
MRKT 430	Sales and Personal Selling [1]	3
MRKT 434	Sales Management	3
Electives - Select one of the following:		3
MRKT 436	Advanced Professional Selling [2]	
MRKT 432	Entrepreneurial Sales	
MRKT 438	Customer Relationship Management (CRM) and Sales Technology	
MRKT 470	Services Marketing	
MRKT 497	FE/Coop Ed/Internship	
MGMT 451	Negotiations	

MGMT 472	Managing Family Enterprises
AGEC 350	Agrisales
SCM 320	Integrated Supply Chain Management
Total Credits	**12**

1

Co-requisite with MRKT 320

2

MRKT 436 Advanced Professional Selling is restricted to students in the professional selling minor and certificate programs. To register for MRKT 436 Advanced Professional Selling students must have declared the minor or certificate program with the Office of Registration and Records.

Requirements for a certificate in Professional Selling

- To complete a certificate, students must earn a C or better in all courses and earn a minimum 2.50 GPA 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.

Minor Requirements

Minor: Professional Selling

Required Credits: 18

Code	Title	Credits
Core Courses		
MRKT 320	Foundations of Marketing	3
MRKT 430	Sales and Personal Selling [1]	3
MRKT 434	Sales Management	3
MRKT 436	Advanced Professional Selling [2]	3
MRKT 497	FE/Coop Ed/Internship (Sales Internship)	3
Elective Course:		3
AGEC 350	Agrisales	
MGMT 472	Managing Family Enterprises	
MGMT 451	Negotiations	
MRKT 432	Entrepreneurial Sales	
MRKT 438	Customer Relationship Management (CRM) and Sales Technology	
MRKT 470	Services Marketing	
SCM 320	Integrated Supply Chain Management	
Total Credits		**18**

1

Co-requisite with MRKT 320

2

MRKT 436 Advanced Professional Selling is restricted to student in the professional selling minor and certificate programs. To register forMRKT 436 Advanced Professional Selling students must have officially declared the minor or certificate program with the Office of Registration and Records.

Program Notes:

- To complete a minor, students must earn a grade of C or better in all courses and earn a minimum 2.50 GPA that is based on the courses used to satisfy the minor requirement.
- If the minor or institutional GPA falls below the 2.50 GPA 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.
- Minor students must satisfy all course pre-requisites.

Professional Writing

Department Information

- **Department Web Site:**
  www.ndsu.edu/english/ (http://www.ndsu.edu/english/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/professional-writing/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/professional-writing/)

The English department offers an undergraduate certificate in professional writing that is open to students enrolled in an undergraduate degree programs at NDSU. The certificate in professional writing offers students the opportunity to develop their written, oral, and digital communication skills in workplace, public, and/or online contexts.

The professional writing certificate promotes competencies such as written communication, visual communication, project planning, interpersonal communication, teamwork, content development and management, and reviewing and editing that can be tailored to students' academic majors and professional goals. As a professional credential, the certificate is suited for those interested in distinguishing themselves through developing their writing skills across a variety of careers, from professional writers to professionals who write, including technical writing, publishing and editing, grant writing, business and management, healthcare, marketing, education, and research.

Professional Writing

Department Information

- **Department Web Site:**
  www.ndsu.edu/english/ (http://www.ndsu.edu/english/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/programs-study/undergraduate/professional-writing/ (http://catalog.ndsu.edu/programs-study/undergraduate/professional-writing/)

Certificate Requirements

Undergraduate Professional Writing

Required Minimum Credits: 9

Code	Title	Credits
Select one course from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 326	Writing in the Design Professions	
PHRM 324	Writing and Professionalization in Pharmacy	
Select one course from the following:		3
ENGL 449	Usability and User Experience	
ENGL 455	International Technical Writing	
ENGL 459	Researching and Writing Grants and Proposal	
Select one from the following: [1]		3
AHSS 472	Introduction to Publishing	
CHP 460	Scientific Writing for Health Professionals (pre-req of PHRM 480 applies)	
COMM 200	Introduction to Media Writing	
COMM 261	Introduction to Web Development	
COMM 310	Advanced Media Writing	
COMM 313	Multimedia Editing	

COMM 362	Principles of Design For Media
COMM 425	Specialty Writing
EDUC 482	Classroom Practice/Methods of Teaching II:
ENGL 229	Introduction to Creative Writing
ENGL 275	Introduction to Writing Studies
ENGL 313	Literary Publications
ENGL 322	Writing and the Creative Process
ENGL 357	Visual Culture and Language
ENGL 358	Writing in the Humanities and Social Sciences
ENGL 449	Usability and User Experience (If not used in the above section)
ENGL 455	International Technical Writing (If not used in the above section)
ENGL 456	Literacy, Culture and Identity
ENGL 458	Advanced Writing Workshop
ENGL 459	Researching and Writing Grants and Proposal (If not used in the above section)
ENGL 496	Field Experience
MRKT 465	Digital Marketing
Total Credits	**9**

[1]

A course not listed in the third category may be allowed but is subject to approval by the certificate Coordinator based on relevancy to the certificate and its learning outcomes. Only one substitution is allowed. The official Substitution Form must be completed and submitted to the Office of Registration and Records during the semester the course is taken.

Psychology

Department Information

- **Department Web Site:**
  www.ndsu.edu/psychology/ (http://www.ndsu.edu/psychology/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/psychology/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/psychology/)

Whether you're interested in psychology as a helping profession or as the science of mind and behavior, the Department of Psychology at North Dakota State University is an exciting place to be. For the last several years, our programs have grown to build on our strengths in health psychology and cognitive neuroscience. Our expanded faculty and graduate programs mean that our undergraduate majors have ample opportunities for participating in cutting-edge research and course work.

Background Information

Psychologists study a broad range of thought and behavior, from normal to abnormal, in both individuals and social groups. What distinguishes psychology from other fields is its strong research orientation. Because psychology is relevant to virtually all professions, students who plan to enter professions such as medicine, law, business management, social work, education or counseling often elect to major or minor in psychology.

Career Opportunities

Most professional positions for psychologists require a master's or doctoral degree. In addition to pursuing graduate work in psychology, recent graduates have entered professional programs in medicine, counseling and guidance, business, special education, social work, law, dentistry, ministry and optometry.

Many of our students seek employment immediately after completing their bachelor's degree. Employers seek out psychology majors for their combination of people and research skills. Some of our graduates have entered positions directly related to psychological services (e.g., mental health aide, psychological testing technician, behavior analyst, or medical research assistant). Others have taken positions not directly concerned with psychological services but related to psychology (e.g., sales, management, law enforcement, corrections, advertising, market research and statistical consulting).

Alumni surveys by the NDSU Career Center have consistently shown that our graduates are very successful in obtaining good jobs or going on to graduate or professional school.

The Program

Undergraduate students can either major or minor in psychology at NDSU. Students majoring in psychology may pursue either a Bachelor of Arts (B.A.) or a Bachelor of Science (B.S.). The primary difference between the two degree programs is that the B.A. degree requires competency at the second-year level of a foreign language while the B.S. requires an approved minor or additional course work in either the natural sciences or the social sciences instead of a language. Both the major and minor requirements within psychology allow each student to select the courses most relevant to his or her own interests.

Advising

Freshman and transfer students receive introductory academic advising from the department's professional advisor in conjunction with NDSU's Career and Advising Center. This preparatory advising continues until students are assigned to a faculty advisor to start their junior year. In addition to these professional and faculty advisors, students can use our web-based advising center to obtain information about the psychology curriculum and career planning. Printed handouts with this information are also available from the department.

One helpful feature is the Career Orientation OverLay (COOL), which has been developed to aid students in selecting courses relevant to their career goals. COOLs are available for behavioral neuroscience (e.g., medicine, medical research), industrial psychology (e.g., business, industry), human services (e.g., clinical psychology, social work), and experimental psychology (e.g., academic and research careers).

Research and Computing Facilities

Students and faculty at NDSU are engaged in research on a wide variety of topics in psychology. Research laboratories include experimental rooms for human research, sound-attenuated chambers, a group lab suite, a virtual reality display system and a driving simulator. Laboratory facilities include advanced equipment for studying human perception, brain function, information processing and social interaction.

Because the program at NDSU emphasizes the scientific approach to the study of behavior, student research is strongly encouraged. Undergraduate students often serve as research assistants working closely with faculty and graduate students. Current research includes projects on health, vision, virtual reality/multi-sensory integration, information processing, behavior modification, emotion, depression, history of psychology, and group processes.

Field Experience

The department maintains excellent relations with a number of service agencies in the Fargo-Moorhead community. Through these contacts, psychology majors can gain field experience in human service settings. At the same time, they earn college credit and gain an understanding of the applications of psychological principles in community service agencies.

Financial Aid

Research and teaching assistantships are sometimes available to advanced undergraduate students. Students can also receive support for work in the department through the NDSU work-study program. In addition, the Psychology Research Award Fund provides money to undergraduates for research projects and travel to professional conferences.

Some scholarships are available for undergraduates. For example, the Patricia Beatty Scholarships provide funding for one to two junior and senior psychology students each year. Students are invited to apply for these scholarships, which are awarded based on grade point average and involvement in department research and activities. Many of our students also have participated in campus-wide programs that sponsor students to do research with faculty mentors (for example, the McNair Scholars program).

High School Preparation

Basic college preparatory courses in high school are sufficient for NDSU psychology majors. Since research and writing skills are particularly important, students should be well-grounded in English, science, social science, and mathematics. Do not be concerned if you have not had psychology in high school—you will get plenty of courses here. In fact, we generally prefer that students take their introductory psychology course at NDSU rather than Advanced Placement Psychology in high school.

Psychology Minors

A total of 18 credits are required in psychology and must include PSYC 111 (Introduction to Psychology) and one 300 or 400-level course. In addition to general psychology minors, more specialized minors are available in neuroscience and managerial psychology.

B.S. in Behavioral Statistics

This interdisciplinary major is the result of a joint effort between the Departments of Psychology and Statistics. (Note: students in this major also complete the requirements for a degree in psychology.) Graduates of this program will have skills in collecting and analyzing data on human behavior, and would be employable in firms that deal with medical or Medicare data, consumer activity, market research, etc. See the psychology web site, your advisor or the *NDSU Bulletin* for detailed information.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110		3	ENGL 120	3
MATH 103 or 104 (R) or Higher[2]		3	Gen Ed Humanities & Fine Arts	3
PSYC 111		3	Any 200 level PSYC class	3
PSYC 189		1	Gen Ed Science & Technology w/Lab	4
Gen Ed Science & Technology		3	Gen Ed Soc & Beh Sci/Glob Persp	3
Gen Ed Social & Behavioral Sciences		3		
		16		**16**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
Any 200 level PSYC class		3	PSYC 351	3
PSYC 350		3	COMM 110	3
Science & Technology Gen Ed		3	Gen Ed Hum & Fine Arts/Cult Div	3
Wellness Gen Ed		2	Supporting track or minor	3
Free Elective		3	Free Elective	4
		14		**16**
Junior				
Fall	**Credits**		**Spring**	**Credits**
ENGL 324, 325, or 459		3	400 level PSYC class[1]	3
PSYC Elective		3	400 level PSYC class[1]	3
Supporting track or minor		3	Supporting track or minor	3
Supporting track or minor		3	Supporting track or minor	3
Free Elective		3	Free Elective	3
		15		**15**
Senior				
Fall	**Credits**		**Spring**	**Credits**
400 level PSYC class[1]		3	400 level PSYC class[1]	3
400 level PSYC class[1]		3	Supporting track or minor	3
Supporting track or minor		3	Free Elective	7
Free Elective		6		
		15		**13**

Total Credits: 120

1

15 total credits in 400-level courses required. Choose at least two courses (6 credits) from Group A and two courses (6 credits) from Group B. Three credits may include PSYC 493 (Undergraduate Research) or PSYC 496 (Field Experience) courses taken for a grade.

2

Students who do not take MATH 104 will need to take 3 Quantitative Reasoning General Education Credits (R) as a Free Elective.

Degree Notes:

- Students earning a Bachelor of Science degree must select one of the three tracks (Natural Science, Social Science or Minor Program of Study) in consultation with an adviser (14 credit minimum).

Psychology

Department Information

- **Department Web Site:**
  www.ndsu.edu/psychology/ (http://www.ndsu.edu/psychology/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/psychology/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/psychology/#planofstudytext)

Major Requirements

Major: Psychology

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Psychology Major Requirements		
PSYC 111	Introduction to Psychology (Cannot be used to satisfy general education category B.)	3
PSYC 189	Skills for Academic Success [1]	1
PSYC 350	Research Methods I	3
PSYC 351	Research Methods II	3
PSYC	Electives	6
Psychology 400 Level Electives		
Select two courses from each Group - A & B		
Group A:		6
PSYC 460	Sensation & Perception	
PSYC 461	Memory And Knowledge	
PSYC 464	Attention & Thinking	
PSYC 465	Psychobiology	
PSYC 486	Neuropsychology	
PSYC 463	Experimental Developmental Psychology	
Group B:		6
PSYC 453	Organizational Psychology	
PSYC 468	Personality	
PSYC 470	Experimental Social Psychology	
PSYC 481	Health Psychology	
PSYC 471	The Psychology Of Aging	
PSYC 472	Advanced Psychopathology	
PSYC 473	Child Psychopathology and Therapy	
Additional PSYC 400 Level Electives		
May include PSYC 493 (Undergraduate Research) or PSYC 496 (Field Experience) courses taken for a grade.		3
Other Required Courses		
ENGL 324	Writing in the Sciences (May satisfy general education category C)	3
or ENGL 325	Writing in the Health Professions	
or ENGL 459	Researching and Writing Grants and Proposal	
MATH 103	College Algebra (or higher)	3
or MATH 104	Finite Mathematics	
Track Elective		
Students earning a Bachelor of Science degree must select one of four tracks listed below in consultation with an adviser: 1) Natural Science track; 2) Social Sciences track; 3) Minor track; or 4) Accelerated (with approval) track.		14-16
Total Credits		**51-53**

Code	Title	Credits
Track: Natural Science		
14 additional credits in math/science. Prefixes accepted include: BIOL, BIOC, BOT, CHEM, ENT, GEOL, MATH, MICR, PHYS, PLSC, STAT, OR ZOO. Courses selected for this track cannot count for general education.		14

Code	Title	Credits
Track: Social Science		
14 additional credits in social sciences (excluding PSYC prefix courses). Prefixes accepted include: ANTH, CJ, ECON, POLS, SOC or HDFS general education courses or courses that include an HDFS general education prerequisite. Courses selected for this track cannot count for general education.		14
Other courses accepted include:		
COMM 114	Human Communication	
COMM 212	Interpersonal Communication	
COMM 216	Intercultural Communication	
COMM 260	Introduction to Web Design	

COMM 271	
COMM 301	Rhetorical Traditions
COMM 402	
COMM 435	Critical Approaches to Popular Culture
COMM 436	
COMM 450	Issues in Communication
COMM 480	
BUSN 487	Managerial Economics
MGMT 320	Foundations of Management
MGMT 330	Foundations of Organizational Behavior
GEOG 151	Human Geography
GEOG 161	World Regional Geography
GEOG 262	Geography of North America

Code	Title	Credits
Track: Minor Program of Study		
A minor in an approved area of study.	Student must official declare the minor with the Office of Registration and Records.	16+

Code	Title	Credits
Track: Accelerated (Master of Public Health Coursework)		
PH 700	Preventing and Managing Chronic Illness	3
PH 704	Public Health Management and Policy	3
PH 706	Essentials of Epidemiology	3
PH 720	Environmental Health	2
PH 725	Promoting Health through Policy, System and Environment	3
Total Credits		**14**

[1]

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

Program Notes

- Students earning a Bachelor of Arts degree must complete the Modern Foreign Language proficiency (3-14 credits).
- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.
- When a student selects psychology as a second major, the student will not have to complete the track elective.
- Students interested in the accelerated track must make application to the Graduate School and submit the Accelerated Declaration form prior to enrollment in any 700 level classes.

Minor Requirements

Minor: Psychology

Required Credits: 18

Code	Title	Credits
Required Courses		
PSYC 111	Introduction to Psychology	3
PSYC Electives	At least one course must be a 300-400 level course	15
Total Credits		**18**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Courses cannot be taken P/F.

Public Health

Department Information

- **Department Web Site:**
  www.ndsu.edu/publichealth/ (http://www.ndsu.edu/publichealth/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/public-health/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/public-health/)

The public health minor engages students in the history and philosophy of public health as well as its core values, concepts and functions across the globe and in society. The minor includes understanding of the socioeconomic, behavioral, and biological factors that impact human health and contribute to health disparities. Communication skills will be emphasized through writing, critical thinking, and other methods of oral and visual/electronic communication. The minor compliments many majors such as Health Services, Emergency Management, Sociology, Microbiology, Exercise Science, Nutrition, and Psychology and is a compliment to pre-health majors. Completing a minor in public health is also a great introduction for students thinking about graduate school to attain a Master of Public Health (MPH).

The field of public health is growing and there is increasing demand for public health professionals as well as other professionals in health-related fields as identified by the U.S. Bureau of Labor Statistics. More specifically, employment in the areas of health education, epidemiology, and statistics are identified as having a growing employment need.

Public Health

Department Information

- **Department Web Site:**
  www.ndsu.edu/publichealth/ (http://www.ndsu.edu/publichealth/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/public-health/ (http://catalog.ndsu.edu/programs-study/undergraduate/public-health/)

Minor Requirements

Minor: Public Health

Required Credits: 20

Code	Title	Credits
Minor Requirements		
PH 101	Introduction to Public Health	3
PH 474	Epidemiology	3
PH 475	One Health	2
SOC 235	Cultural Diversity	3
STAT 330	Introductory Statistics	3
Select one from the following:		3
PHRM 324	Writing and Professionalization in Pharmacy	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 326	Writing in the Design Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
Select one elective from the following:		3
ANTH 332	Medical Anthropology	
EMGT 101		
EMGT 345		
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	

HNES 250	Nutrition Science
POLS 215	Problems and Policies In American Government
SOC 431	Environmental Sociology
Total Credits	**20**

Public History

Department Information

- **Department Web Site:**
  www.ndsu.edu/history/ (http://www.ndsu.edu/history/)
- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/public-history/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/public-history/)

Do you like to study history but wonder what you can do with a history degree? If so, the public history program at North Dakota State University may be for you. Public history is an umbrella field that encompasses archival work, museum studies, collections management, historic preservation, cultural resource management, and many other public facing historical professions. This innovative program trains and educates undergraduates in a variety of applied history fields. It provides students with the opportunity to explore a variety of careers and prepares them for employment or graduate school in the expanding field of public history. Examples of opportunities for public history majors include employment in historical societies, museums, archives, historic preservation, corporations, municipalities, labor and farm organizations, and state and federal government agencies.

THE PROGRAM

The core of the major is 51 credits, which consists of a well-integrated combination of courses designed to provide students with training in history and in the specific field of public history. The goal of the program is to provide a structured framework of courses and allowance for some flexibility to reflect personal interests. The public history major provides students with a solid foundation in history content and methodology and introduces them to the sub-fields of public history. A crucial part of the program is an approved internship of nine credit hours at a historical agency, often at local museums such as Bonanzaville in West Fargo or the Historical and Cultural Society of Clay County at the Hjemkomst Center in Moorhead, Minnesota. The internship is an opportunity for practical, on-the-job experience in public history.

CAREER OPPORTUNITIES

Recent graduates in public history are employed at the State Historical Society of North Dakota, the National Park Service, and at regional county museums and historic sites. Currently, the U.S. Department of Labor predicts that openings at public history sites is “projected to grow 9 percent from 2018 to 2028, faster than the average for all occupations.” Further information on career opportunities can be found in the *Occupational Outlook Handbook* published by the U.S. Department of Labor. Some students decide to pursue further graduate study after completing a public history degree at NDSU. Several of our recent graduates have been admitted to leading graduate public history programs such as the Cooperstown Museum Studies Program and Middle Tennessee State University.

THE CURRICULUM

Students begin with 9 to 15 credits at the 100-200 level to provide a foundation for their later work. Public history courses at the 200 level may be used to meet this requirement. Year-long survey courses in U.S. history and Western Civilization are provided to give students a basic knowledge of the history of the United States and of the wider cultural heritage of the western world. After completing 100-200 level courses, students complete a course on historical research and writing. At the junior or senior level, students take a sequence of courses in American, European, and World history. These courses provide students with in-depth historical content. Courses in museum collections management, digital history, and public memory and memorialization are also required. The resources of the North Dakota Institute for Regional Studies at the NDSU Archives are used in these classes. Three to nine more credits of history at the junior or senior level are required to gain further historical knowledge; these courses are chosen after consultation with an advisor. A three-credit senior seminar is required of all history majors as a capstone experience.

Courses such as introduction to public history, museum studies, collections management, and digital history are designed to instill knowledge of specific areas in public history. The introduction to public history course provides an overview of the field and an opportunity to create a public history project. The museum studies course familiarizes students with the theory and practice of museum work and provides experience creating an exhibit. The collections management course focuses on the care and management of museum collections. These courses and the required historical content courses provide students with an understanding of cultural, political, social and economic changes through time and teach students how to craft an interpretation of those changes.

Finally, a nine-credit internship provides practical experience in the field of public history. The State Historical Society of North Dakota (and other local and regional historical agencies) provide opportunities in areas such as collections management, archival work, historical editing, historical preservation, and interpretation of historic sites.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
HIST 101, 102, 103, or 104		3	COMM 110	3
ENGL 110		3	ENGL 120	3
Gen Ed Social & Beh Sci		3	Gen Ed Science & Technology w/ Lab	4
Gen Ed Science & Technology		3	Free Electives	6
Free Elective		3		
		15		**16**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
HIST 251		3	HIST 252 or 352	3
Gen Ed Science & Technology		3	US or Non-US History Req.	3
Gen Ed Wellness		2	Gen Ed Quantitative Reasoning	3
Free Electives		6	Free Electives	6
		14		**15**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
HIST 390		3	HIST 352 or 252	3
HIST 401		3	HIST 403	3
HIST 404		3	HIST 415	3
US or Non-US History Requirement		3	HIST 496	3
Free Elective		3	Free Elective	3
		15		**15**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
HIST 489		3	HIST 496	3
HIST 496		3	US or Non-US History Requirement	3
US or Non-US History Req.		3	Free Electives	9
Free Electives		6		
		15		**15**

Total Credits: 120

Public History

Department Information

- **Department Web Site:**
  www.ndsu.edu/history/ (http://www.ndsu.edu/history/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**

catalog.ndsu.edu/programs-study/undergraduate/public-history/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/public-history/#planofstudytext)

Major Requirements

Major: Public History

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Thirty-three (33) credits of the major must be taken in residence at NDSU.

Code	Title	Credits
Core Requirements		
Select one history survey course from the following:		3
HIST 101	Western Civilization I	
HIST 102	Western Civilization II	
HIST 103	U.S. to 1877	
HIST 104	U.S. Since 1877	

HIST 251	Introduction To Public History	3
HIST 252	Introduction to Museum Work	3
HIST 352	Museum Collections Management	3
HIST 390	Historical Research and Writing	3
HIST 401	Archival Theory and Practice	3
HIST 403	Archival Preservation	3
HIST 404	Digital History	3
HIST 415	Public Memory and Memorialization in America	3
HIST 489	Senior Seminar (Capstone)	3
HIST 496	Field Experience (Approved Internship)	9
Distribution Requirement: Minimum credit required for each distribution area.		
U.S. History: Select 6 credits from the following:		6
RELS 340		
RELS 345	Church and State in America	
HIST 382		
HIST 420	Colonial American History	
HIST 422	American Civil War and Reconstruction	
HIST 423	The Gilded Age and Progressive America	
HIST 424	U.S. History 1917-1960	
HIST 425	U.S. History 1917-Present II	
HIST 426	Women in American History	
HIST 428		
HIST 431	The North American Plains	
HIST 434	Environmental History	
HIST 436	American Frontier to 1850	
HIST 437		
Non U.S. History: Select 6 credits from the following:		6
HIST 320	History of Christianity (May satisfy general education category A and G)	
HIST 355	Global Islam	
HIST 381	Australia & New Zealand	
HIST 440	The Ottoman Empire	
HIST 450	Ancient History	
HIST 451	Medieval History	
HIST 454	Renaissance And Reformation	
HIST 455		
HIST 456	Europe 1815-1914	
HIST 457	Europe Since 1914	
HIST 464	Imperial Spain	
HIST 465	Germany since 1750	
HIST 467	History Of Russia II	
HIST 473	Colonial Mexico	
HIST 474	Modern Mexico	
HIST 477	Slavery in the Atlantic World	
HIST 480	History of Modern China from 1600	
HIST 481	History of Japan	
HIST 482	Vietnam: 125 Years of Conflict	
HIST 484	Cultures and Civilizations of the Pre-modern World	
HIST 485	Cultural Exchange and the Making of the Modern World	
Total Credits		**51**

Public Policy

Department Information

- **Department Web Site:**
  www.ndsu.edu/politicalscience/ (http://www.ndsu.edu/politicalscience/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/public-policy/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/public-policy/)

The Public Policy Minor introduces students to the theory and practice of policy analysis. The interdisciplinary coursework teaches students to identify problems, consider possible solutions, design effective programs, and evaluate whether established policies meet their intended goals. Individuals with backgrounds in public policy go on to work in government agencies, non-profits, think tanks, and political advocacy organizations as well as the private sector. In addition, the minor is a great introduction for students thinking about graduate school to attain a Master of Public Policy (MPP) which is also offered by the Department of Political Science and Public Policy. The Public Policy Minor is open to all majors.

THE FACULTY

Faculty in the Department of Political Science and Public Policy have expertise in areas ranging from local and state governance to global policy and international relations as well as law, the judicial system, and the dawning digital society. Our faculty draw upon their experiences as program evaluators and consultants for government, private firms, and non-profits to provide a cutting edge and practice-informed education to NDSU students. We encourage students who want to learn more about the Public Policy Minor to reach out through email or schedule an appointment via Bison Advise (https://career-advising.ndsu.edu/bison-advise-for-students/).

Public Policy

Department Information

- **Department Web Site:**
  www.ndsu.edu/politicalscience/ (http://www.ndsu.edu/politicalscience/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/public-policy/ (http://catalog.ndsu.edu/programs-study/undergraduate/public-policy/)

Minor Requirements

Minor: Public Policy

Required Credits: 18

Code	Title	Credits
Core Courses		
POLS 215	Problems and Policies In American Government	3
POLS 420	Political Behavior-Executive-Legislative Process	3
or POLS 422	State and Local Politics	
or POLS 423	Public Policy Analysis	
POLS 442	Global Policy Issues	3
or POLS 450	Politics of the Developing Countries	
or POLS 452	Comparative Political Economy	
Additional Public Policy Related Courses: Choose 3 classes from the following-at least one must be POLS 400 level		9
COMM 383	Organizational Communication I	
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	
EMGT 101		
SOC 115	Social Problems	
SOC 116	Global Social Problems	
SOC 233	Sociology of Organizations and Work	
SOC 405	Community Development	

SOC 410	Social Inequality
HDFS 353	Children, Families and Public Policy
HDFS 480	Community Resources of Later Life
POLS 231	Law and Society
POLS 420	Political Behavior-Executive-Legislative Process *
POLS 422	State and Local Politics *
POLS 423	Public Policy Analysis *
POLS 424	Inequality and Public Policy
POLS 432	Crime and Public Policy
POLS 433	Law and Public Policy
POLS 442	Global Policy Issues *
POLS 450	Politics of the Developing Countries *
POLS 452	Comparative Political Economy *
POLS 496	Field Experience
Total Credits	**18**

*
Can be used as the additional elective if not taken for the core courses.

Program Notes:

- Political Science majors: Courses completed for this minor cannot be double-counted with the Political Science major.

Publishing

Department Information

- **Department Web Site:**
  ndsupress.org/ (http://ndsupress.org/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/publishing/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/publishing/)

The certificate in publishing prepares students to work within the unique framework of the publishing industry while gaining experience in the top skills employers seek among college graduates: communication, problem solving, ability to work in a team, and project management. The certificate in publishing delivers an educational experience that allows students to learn about the history, business, and practice of publishing scholarly and literary works. The courses offer in-depth, experiential learning with a decades-old publishing house, applying current methods and customs of scholarly and literary publishing, all while meeting real-time production deadlines and schedules in preparation for national distribution of North Dakota State University Press books. The key topics for the certificate in publishing focus on the process of managing the creation, publication, and distribution of print and electronic books and other text products, and preparing individuals to manage the editorial, technical, and business aspects of publishing operations. The certificate in publishing includes instruction in product planning and design, editing, author and public relations, business and copyright law, publishing industry operations, contracting and purchasing, product marketing, electronic publishing and commerce, the history of publishing, and professional standards and ethics.

Publishing

Department Information

- **Credential Offered:**
  UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/publishing/ (http://catalog.ndsu.edu/programs-study/undergraduate/publishing/)

Certificate Requirements

Publishing

Required Credits: 12

Code	Title	Credits
AHSS 472	Introduction to Publishing	3
AHSS 476	Practicum in Publishing	3
AHSS 496	Field Experience	3
Additional Requirement *		3
Total Credits		**12**

*

Additional requirement coursework to be determined in collaboration with a student's goals and the program coordinator. Experiences related to the field of publishing, such as contemporary literature, graphic design, marketing & publicity, bookkeeping, editing, digital history, etc. The department will need to submit a substitution form to the Office of Registration and Records in order for it to apply to this certificate since it is an undefined additional requirement.

Radiologic Sciences

Department Information

- **Department Web Site:**
  www.ndsu.edu/alliedsciences/ (http://www.ndsu.edu/alliedsciences/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/radiologic-sciences/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/radiologic-sciences/)

Radiologic Sciences at North Dakota State University combines foundational science, math, and general education courses on campus with applied imaging classroom, lab, and clinical education during a two-year full-time internship within an affiliated hospital. Three unique and specialized internships available to RS majors are radiography, diagnostic medical sonography, and echocardiography.

Background Information

Radiographers, also known as **radiologic technologists**, perform diagnostic imaging examinations, accurately position patients, obtain quality diagnostic images, and adhere to radiation protection regulations for themselves, their patients, and coworkers. They work closely with radiologists, the physicians who interpret medical images, to diagnose or rule out disease or injury. Radiologic technologists are educated in anatomy, patient positioning, examination techniques, equipment protocols, radiation safety, radiation protection and basic patient care. To become a registered radiologic technologist, RT(R), students must complete an accredited educational program, earn an academic degree, and pass a national certification examination. To remain registered, they must earn continuing education credits.

Radiologic technologists work in hospitals, physician offices and clinics, or diagnostic imaging centers. Multi-skilled RT(R)s who are educated and credentialed in more than one type of imaging technique are most marketable. With experience and additional training, general radiographers may become specialists in CT, magnetic resonance imaging, mammography, interventional radiography, or advance into management or education. Radiation therapy, sonography, and nuclear medicine typically require additional specialized formal education in a dedicated training program. Currently there are job openings throughout the country. According to the U.S. Department of Labor Bureau of Labor Statistics (https://www.bls.gov/ooh/healthcare/radiologic-technologists.htm), employment of radiologic technologists is expected to grow faster than average for all occupations through 2026. An increase in medical conditions among the aging baby-boom population will require imaging as a tool to making diagnoses. Mean annual earnings for radiologic technologists in 2022 was $ 70,240 (Radiologic and MRI Technologists : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics (bls.gov) (https://www.bls.gov/oes/current/oes292034.htm)

Sonographers use special equipment and high frequency sound waves (ultrasound) to obtain images of internal body structures and organs. They have a high level of patient interaction and play a vital role in providing the physician with quality images to interpret, assess, and diagnose medical conditions or conduct surgical procedures. Two options for NDSU students interested in sonography are echocardiography and diagnostic medical sonography. **Echocardiographers**, also known as cardiac sonographers, evaluate the anatomy and hemodynamics (blood flow) of the heart, its chambers and valves, and related blood vessels. **Diagnostic medical sonographers** evaluate abdominal structures like the kidney, liver, and spleen, breast tissue, the reproductive system, blood vessels, fetal development, and musculoskeletal structures like tendons and joints. Sonographers are educated in anatomy and pathophysiology, patient positioning, examination techniques, equipment protocols, and basic patient care and safety. To become registered, students must complete an accredited educational program and pass national certifying examinations. To remain registered, they must earn continuing education credits.

Sonographers work in hospitals, physician offices, and medical and diagnostic laboratories. Currently there are job openings throughout the country. According to the U.S. Department of Labor Bureau of Labor Statistics (https://www.bls.gov/ooh/healthcare/diagnostic-medical-sonographers.htm), the demand for sonographers will continue to grow much faster than average for all occupations through 2026. This demand is attributed to the likelihood that the need to diagnose medical conditions within an aging baby-boom population will increase, as well as the continued

need for ultrasound as an alternative to imaging that involves radiation. Mean annual wages for diagnostic medical sonographers in 2022 was $78,210 (Diagnostic Medical Sonographers and Cardiovascular Technologists and Technicians, Including Vascular Technologists : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics (bls.gov) (https://www.bls.gov/ooh/healthcare/diagnostic-medical-sonographers.htm)

The Program

A Bachelor of Science degree, major in Radiologic Sciences, includes two or more years of rigorous academic courses on campus followed by a two-year full-time professional-level internship in an affiliated hospital-based program. RS students must have an interest and aptitude in the sciences and math and a strong desire to work directly with patients. Academic courses include chemistry, physics, anatomy and physiology, microbiology, trigonometry, psychology, statistics, and computer sciences, in addition to general education courses. Students pursuing any one of the three specializations in radiography, echocardiography, or diagnostic medical sonography will complete the same pre-radiologic sciences college courses. Transfer students must complete a minimum of 12-20 resident credits at NDSU prior to start of the internship. Residency requirements vary by RS specialization. During their final year of courses on campus, qualified students will apply for the two-year internship. The internship class and clinical education prepares the graduate to work in their respective area of specialization in radiography, diagnostic medical sonography, or echocardiography. College courses and the internship classes, lab, and clinical education constitute the four-year degree awarded by NDSU. Radiography graduates are eligible to take the national certifying exam administered by the American Registry of Radiologic Technologists (https://www.arrt.org/) to earn the RT(R) credential. Sonography graduates are eligible to take national certifying exams appropriate to their specialization and administered by the American Registry for Diagnostic Medical Sonography (http://www.ardms.org/Pages/default.aspx).

Internship Application and Admission

The internship application process begins annually in the fall. Internship admission is competitive. Admission criteria are established in collaboration with affiliated hospital programs and generally includes successful completion of all college courses on campus with a minimum grade of C, grade point averages (a minimum of 2.50-3.00 is required and varies by hospital program), references, related experience, interview and ability to meet program-designated technical standards, or request accommodations to execute those skills. Technical standards include a sound intellect and emotional health to exercise good judgement even in emergencies, visual and hearing acuity, physical abilities to lift and position patients, pull, push, carry equipment, enter data, stand and walk for extended periods of times and communicate effectively. In addition, students must also comply with criminal background and student conduct requirements.

Radiography. Pre-RS students who apply and are accepted into the radiography internship will complete their applied classroom and clinical education in one of the following affiliated hospital-based radiologic technology programs: Avera McKennan Hospital (Sioux Falls, SD), Mercy/St Luke's Hospitals (Cedar Rapids, IA), Sanford Medical Center (Bismarck and Fargo, ND, Sioux Falls, SD), St. Cloud Hospital (St. Cloud, MN), St. Luke's College (Sioux City, IA), UnityPoint Health (Des Moines, IA), and the Veteran Affairs Medical Center (Minneapolis, MN). Affiliated hospital programs maintain programmatic accreditation through the Joint Review Committee on Education in Radiologic Technology (https://www.jrcert.org/). Internship classes and clinical experience will focus on patient care, anatomy and physiology, radiation physics and protection, imaging principles, positioning, radiobiology, and pathology.

Sonography. Pre-RS students who apply and are accepted into one of the sonography specializations will complete the 21-month internship offered by Sanford Medical Center Fargo. Internship classes, scanning labs, and clinical experience for echocardiography will focus on adult echocardiography with rotations in pediatric and stress echo. Internship classes, scanning labs, and clinical experience in diagnostic medical sonography will focus on abdomen, OB/GYN, small parts, and vascular sonography. SMCF's sonography programs are accredited by the Commission on Accreditation of Allied Health Education Programs (https://www.caahep.org/).

It is highly recommended that students interested in an RS major meet with the RS advisor at least one year prior to anticipated internship application to discuss areas of specialization, internship admission, and create a plan of study for successful completion of degree requirements. Information about the RS professions and specializations, curriculum, internship, and advising contacts are available from the NDSU Department of Allied Sciences (https://www.ndsu.edu/alliedsciences/).

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
CHEM 117	3	BIOC 260	4
CHEM 117L	1	ASCI 125	1
ASCI 190	3	STAT 330	3
CSCI 114	3	MICR 202	2
ENGL 110*	3	MICR 202L	1

MATH 105	3	PSYC 111	3
Gen Ed Wellness	2	ENGL 120*	3
	18		**17**

Second Year					
Fall	**Credits**	**Spring**	**Credits**		
BIOL 220	3	BIOL 221	3		
BIOL 220L	1	BIOL 221L	1		
Humanities & Fine Arts (A)	3	PHRM 170	2		
PHYS 211	3	PHYS 212	3		
PHYS 211L	1	PHYS 212L	1		
RS 200	1	Gen Ed Hum & Fine Arts/Cult Div	3		
COMM 110	3	Special Elective (dept. approved)	3		
Gen Ed Soc & Beh Sci/Glob Persp	3				
	18		**16**		

Third Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
RS 496**	12-13	RS 496**	12-14	RS 496**	6-11
				Upper Division Writing (300-400 level)	3
	12-13		**12-14**		**9-14**

Fourth Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
RS 496**	12	RS 496**	12	RS 496**	1-6
	12		**12**		**1-6**

Total Credits: 127-140

*
All students are required to successfully earn credit for Engl 110 and Engl 120. Enrollment is based on English Placement. Upon completion of Engl 120 with a "C" grade or higher, students will be awarded placement credit (4) for Engl 110.

**
RS 496 classroom, lab, and clinical education (internship) takes place within an affiliated hospital. The internship is full-time for 21-24 months, including summer. RS 496 courses and credits vary by radiography, echocardiography, or diagnostic medical sonography specialization.

Radiologic Sciences

Department Information

- **Department Web Site:**
  www.ndsu.edu/alliedsciences/ (http://www.ndsu.edu/alliedsciences/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/radiologic-sciences/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/radiologic-sciences/#planofstudytext)

Major Requirements

Radiologic Sciences Major

Degree Type: B.S.

Minimum Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Radiologic Science Major Requirements		
CHP 190		3
RS 200	Introduction to Radiologic Sciences	1
RS 496	Field Experience	60
Internship	Professional education (internship) within an accredited affiliated school of radiologic technology includes the capstone experience.	
BIOC 260	Elements of Biochemistry	4
or BIOC 460	Foundations of Biochemistry and Molecular Biology I	
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 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab	4

CSCI 114	Computer Applications	3
or TL 116	Business Software Applications	
MATH 105	Trigonometry (or higher level)	3
CHP 125	Medical Terminology for Health Professionals	1
PHRM 170	Common Diseases, Prevention, and Treatment	2
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4
PSYC 111	Introduction to Psychology	3
STAT 330	Introductory Statistics	3
Select one microbiology course and lab from the following:		3-5
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	
Major Elective: Select one of the following		3
ANTH 332	Medical Anthropology	
PHIL 210	Ethics	
SOC 417	Sociology of the Family	
SOC 440	Sociology of Aging	
SOC 441	Death and Dying	
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	
COMM 380	Health Communication I	
COMM 381		
COMM 383	Organizational Communication I	
CHP 400	Interprofessional Health Care Practice	
Total Credits		**109-111**

Degree Requirements and Notes

- All required courses must be completed with a grade of 'C' or above. All students must maintain a semester GPA of 2.0 or above for each semester in the College. A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the College.
- Completion of the prerequisites does not guarantee a student internship. Selection of interns is competitive. Please consult your Radiologic Sciences advisor for more information.

Range Science

Department Information

- **Department Web Site:**
  https://www.ndsu.edu/snrs/
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/range-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/range-science/)

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. A minor in Range Science will further broaden your environmental education and offer unique hands-on experiences. Range science is offered as a minor program of study only.

Range Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/snrs/ (http://www.ndsu.edu/snrs/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/range-science/ (http://catalog.ndsu.edu/programs-study/undergraduate/range-science/)

Minor Requirements

Minor: Range Science

Required Credits: 16

Code	Title	Credits
Required Courses		
RNG 136	Introduction to Range Management	3
RNG 225	Natural Resource & Agro-Ecosystems	3
RNG 450	Range Plants	3
Select one of the following:		3
RNG 452	Managing Natural and Rangeland Resources using GIS	
RNG 453	Rangeland Resources Watershed Management	
RNG 460		
RNG 456	Ecological Restoration	3
or RNG 458	Grazing Ecology	
Elective Course: Seminar may be used to fulfill this elective.		**1**
Total Credits		**16**

Minor Requirements and Notes:

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

Real Estate Valuation

Department Information

- **Department Web Site:**
  https://www.ndsu.edu/business/
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  /undergraduate/program-curriculum/real-estate-valuation/ (http://catalog.ndsu.edu/programs-study/undergraduate/real-estate-valuation/http:///undergraduate/program-curriculum/real-estate-valuation/)

Real estate valuation serves as the foundation for informed decision-making by investors, lenders, and homeowners in the real estate industry. It focuses on determining the market value of a property through various quantitative and qualitative methods. The real estate field offers a diverse range of career opportunities, from residential appraisers and commercial property valuers to valuation analysts and consultants. According to O*Net.com, the field for property appraisers and assessors has a bright outlook with projected annual job openings of 6,900 from 2022-2032. According to the US Bureau of Labor Statistics, the median annual wage for property appraisers and assessors was $61,630 in May 2023. Professionals with expertise in real estate valuation are in high demand, particularly in urban and rapidly growing suburban areas.

Real Estate Valuation

Department Information

- **Department Web Site:**
  https://www.ndsu.edu/business/
- **Credential Offered:**
  Minor
- **Program Overview:**
  /programs-study/undergraduate/real-estate-valuation/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/real-estate-valuation/http:///programs-study/undergraduate/real-estate-valuation/)

Minor Requirements

Minor: Real Estate Valuation

Required Credits: 18

Code	Title	Credits
BUSN 431	Business Law I-Contracts, Property and Torts	3
BUSN 347	Principles of Real Estate	3
or AGEC 347	Principles of Real Estate	
FIN 320	Principles of Finance	3
FIN 459	Intermediate Appraisal of Real Estate	3
FIN 452	Real Estate Lending	3
Select one class from the following:		3
AGEC 346	Applied Risk Analysis	
CM&E 200	Construction Documents and Codes	
CM&E 380	Construction Estimating: Quantities and Costs	
FIN 400 Level	Any FIN prefix course	
Total Credits		**18**

Religion

Department Information

- **Department Web Site:**
  www.ndsu.edu/history/ (http://www.ndsu.edu/history/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/religious-studies/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/religious-studies/)

The objectives for the minor in religion include:

- Cultivate foundational knowledge of the history, rituals, scriptures, and beliefs of major world religions.
- Critically interpret representations of religious movements and religious conflict found in popular culture, the arts, and news media.
- Analyze the complex historical, political, and cultural backgrounds of global and historical religious movements and conflicts.
- Designed for students to comprehend how religion can foment both social justice and acts of violence, complacency and rebellion, liberation movements and imperialism, compassion and tyranny.
- Apply historical, anthropological, sociological, and literary methods to religious phenomena, including texts, images, material objects, institutions, theologies, and movements.
- Respectfully debate the role of religion in public life and politics.

Religion

Department Information

- **Department Web Site:**
  www.ndsu.edu/history/ (http://www.ndsu.edu/history/)
- **Credential Offered:**
  Minor

- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/religious-studies/ (http://catalog.ndsu.edu/programs-study/undergraduate/religious-studies/)

Minor Requirements

Minor: Religion

Required Credits: 18

Code	Title	Credits
Required Minor Courses		
RELS 100	World Religions	3
RELS	300-400 level electives	9
RELS	Additional electives	6
Total Credits		**18**

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.
- For advice on the distribution of electives consult with religious studies faculty members.

Respiratory Care

Department Information

- **Department Web Site:**
  www.ndsu.edu/alliedsciences/ (http://www.ndsu.edu/alliedsciences/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/respiratory-care/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/respiratory-care/)

Respiratory Care is an allied health profession that specializes in the evaluation, treatment, and education of patients with cardiopulmonary (heart-lung) disorders. Respiratory therapists (RTs) work closely with patients, physicians, nurses and other healthcare team members in critical care, emergency rooms, nurseries and pediatrics, medical units and home care. RTs' diverse responsibilities include patient assessment, medical gas therapy, pulmonary hygiene, diagnostic testing, mechanical ventilatory and cardiovascular support, rehabilitation activities, and consulting with physicians to develop treatment plans.

Background Information

The practice of respiratory care encompasses activities in diagnostic evaluation, therapy, and education of the patient, family and public. Diagnostic activities include obtaining and analyzing sputum and blood specimens, performing breathing studies to determine if lung function is impaired, performing sleep disorder studies and interpreting the data obtained from these. Therapy includes administering medical gases and respiratory medications to alleviate breathing problems, initiating and managing mechanical ventilators, establishing and maintaining artificial airways, performing pulmonary hygiene procedures and cardiopulmonary rehabilitation activities. Education of the patient, family and public promotes knowledge of disease processes, therapy and wellness. These essential functions of the RT are practiced under qualified medical direction.

Career Opportunities

Graduates of the respiratory care program are eligible to complete a series of national examinations administered by the National Board of Respiratory Care that lead to the Registered Respiratory Therapist (RRT) credential. NDSU graduates have enjoyed excellent pass rates on these certifying exams. Most states require a license to practice respiratory care and use these examinations or verification of credentials for state licensing. To remain licensed, RTs may also be required to obtain continuing education credit. Graduates readily find employment in hospital, clinic and home care settings throughout the country. Additional career opportunities exist in management, education, sleep medicine, research, sales and public health. According to the U.S. Department of Labor Bureau of Labor Statistics (https://www.bls.gov/ooh/healthcare/respiratory-therapists.htm), employment of respiratory therapists is expected to grow much faster than the average for all occupations through the year 2026. This increased demand is attributed to growth in the middle-aged and elderly populations that will increase the incidence of respiratory conditions, advances in preventing and detecting disease, and improved medications and sophisticated treatments. Mean annual wages (https://www.bls.gov/oes/2018/may/oes291126.htm) for respiratory therapists in 2022 was $70,540 (Respiratory Therapists : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics (bls.gov) (https://www.bls.gov/ooh/healthcare/respiratory-therapists.htm).

The NDSU/Sanford Respiratory Care Program

A Bachelor of Science degree with a major in respiratory care from North Dakota State University includes two to three years of academic courses and a 15-month professional-level internship at Sanford Medical Center Fargo. The NDSU/Sanford Respiratory Care program is accredited by the Commission on Accreditation for Respiratory Care.

Academic courses include college algebra, chemistry, physics, anatomy and physiology, microbiology, psychology and computer science, in addition to general education courses. Transfer students need to successfully complete a minimum of 8 resident credits at NDSU prior to starting the internship. The full-time internship consists of lecture, lab and clinical education, which prepares the student to enter the profession of respiratory care.

Near the end of the internship, students design a specialty proposal for a focused clinical experience (RC 494, Individual Study). Common specialty areas include: neonatal/pediatric general or intensive care, adult general or intensive care, cardiopulmonary diagnostics, pulmonary rehabilitation or home care, education, and management.

Internship Admission

Admission to the internship is selective. Qualified students apply during the spring of the academic year during which they will complete all courses on campus. Admission is based upon successful completion of all internship prerequisites (8 resident credits at NDSU), cumulative and core course grade point averages (a minimum of 2.50 is required; the maximum number of core course attempts is two), related experience, references, an interview, and compliance with criminal background and student conduct requirements. In addition, students admitted to the NDSU/Sanford Respiratory Care Program must possess the ability to complete the entire curriculum which requires that the student meet designated technical standards, or request accommodations to execute these skills. Technical standards include cognitive, physical, motor and tactile abilities, visual acuity, and speaking, hearing and interactive requirements. Internship applications are available from the NDSU Department of Allied Sciences. Deadline for receipt of completed applications is March 1. An admission committee selects the interns.

It is highly recommended that students interested in the RC major meet with the respiratory care advisor to discuss degree requirements, internship admission, and create an individualized plan of study at least one year in advance of applying for the internship. Information about the profession, curriculum, internship, technical standards, and advising contacts are available from the Department of Allied Sciences. (https://www.ndsu.edu/alliedsciences/)

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
CHEM 117	3		BIOC 260	4
CHEM 117L	1		STAT 330	3
ASCI 190	3		MICR 202†	2
CSCI 114	3		MICR 202L†	1
ENGL 110*	3		ENGL 120*	3
MATH 103†	3		ASCI 125	1
			Gen Ed Wellness	2
	16			**16**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
BIOL 220†	3		BIOL 221†	3
BIOL 220L†	1		BIOL 221L†	1
COMM 110	3		PHYS 120†	3
RC 200	1		PHRM 170	2
PSYC 111	3		Special Elective (dept. approved)	3
Special Elective (dept. approved)	3		Gen Ed Soc & Beh Sci/Glob Persp	3

Gen Ed Hum & Fine Arts/Cult Div	3	Gen Ed Humanities & Fine Arts	3
	17		**18**

Third Year							
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**		
RC 496**	15	RC 496**	15	RC 496**	13		
	15		**15**		**13**		

Fourth Year	
Fall	**Credits**
RC 496**	8
RC 494**	4
Gen Ed Upper Division Writing (300-400)	3
	15

Total Credits: 125

*
All students are required to successfully earn credit for Engl 110 and Engl 120. Enrollment is based on English Placement. Upon completion of Engl 120 with a "C" grade or higher, students will be awarded placement credit (3) for Engl 110.

**
Credits earned while participating in the Sanford Medical Center Fargo RC internship. The internship is 15 months, including one summer session.

†
Indicates "core" course. A minimum "core" course GPA of 2.50 is required. "Core" courses must be completed with a grade of "C" within two attempts.

Respiratory Care

Department Information

- **Department Web Site:**
  www.ndsu.edu/alliedsciences/ (http://www.ndsu.edu/alliedsciences/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/respiratory-care/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/respiratory-care/#planofstudytext)

Major Requirements

Major: Respiratory Care

Degree Type: B.S.
Minimum Degree Credits to Graduate: 126

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Respiratory Care Major Requirements		
CHP 190		3
RC 200	Introduction to Respiratory Care	1
RC 496	Field Experience	51
RC 494	Individual Study	4
Advanced clinicals including the capstone experience.		
BIOC 260	Elements of Biochemistry *	3 or 4
or BIOC 460	Foundations of Biochemistry and Molecular Biology I	
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
CHP 125	Medical Terminology for Health Professionals *	1
PHRM 170	Common Diseases, Prevention, and Treatment	2
CSCI 114	Computer Applications	3
or TL 116	Business Software Applications	
MATH 103	College Algebra *	3
PHYS 120	Fundamentals of Physics *	3
PSYC 111	Introduction to Psychology	3
STAT 330	Introductory Statistics	3
Chemistry Sequence: Select one sequence depending on future educational goals from the following:		4 or 8
CHEM 117 & 117	Chemical Concepts and Applications and Chemical Concepts and Applications *	
CHEM 121 & 121L & CHEM 122 & CHEM 122L	General Chemistry I and General Chemistry I Laboratory and General Chemistry II and General Chemistry II Laboratory *	
Microbiology Sequence: Select one microbiology course & lab from the following:		3-5

MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab *	
MICR 350 & 350L	General Microbiology and General Microbiology Lab *	
Major Electives: Select one from the following:		3
ANTH 332	Medical Anthropology	
SOC 417	Sociology of the Family	
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		
COMM 383	Organizational Communication I	
CHP 400	Interprofessional Health Care Practice	
Total Credits		**101-108**

*
These core courses have a maximum of two attempts allowed.

Degree Requirements and Notes

- All required courses must be completed with a grade of 'C' or above. All students must maintain a semester GPA of 2.0 or above for each semester in the College. A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the College.
- Completion of the prerequisites does not guarantee a student internship. Selection of interns is competitive. Please consult your Respiratory Care advisor for more information.

Robotics

Department Information

- **Department Web Site:**
  www.ndsu.edu/coe/ (http://www.ndsu.edu/coe/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/robotics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/robotics/)

Robotics is a branch of engineering that combines mechanical engineering, electronics engineering, manufacturing engineering, computer science and other fields of engineering at different degrees. A minor in Robotics equips students with skills required for designing and construction of robot mechanisms; designing and development of electronic control systems using sensory feedback and information processing to generate robotic motions by various actuators; and programming and application of robots for carrying out tasks that would be regarded as dirty, dull and dangerous (DDD) to a human being.

Robotics

Department Information

- **Department Web Site:**
  www.ndsu.edu/coe/ (http://www.ndsu.edu/coe/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/robotics/ (http://catalog.ndsu.edu/programs-study/undergraduate/robotics/)

Minor Requirements

Minor: Robotics

Required Credits: 18

Code	Title	Credits
Part One - Core Content Areas: 9 credits are required for Part One		
1) Robotics Principles Area (Required)		
ENGR 321	Introduction to Robotics	3
2) Take two courses from two of the 3 areas listed below for Part One.		6
Core Programming Area		
ME 213	Modeling of Engineering Systems	
CSCI 122	Visual BASIC	
CSCI 227	Computing Fundamentals in Python I	
ECE 173	Introduction to Computing	
Controls and Robot Applications Area		
ABEN 358	Electric Energy Application in Agriculture	
CSCI 485	Autonomous Command and Artificial Intelligence for Robots and Other Cyber-Physical Systems	
ECE 461	Control Systems I	
ECE 463	Modern Control	
IME 482	Automated Manufacturing Systems	
ME 475	Automatic Controls	
Measurements and Actuation Systems Area		
ABEN 479	Fluid Power Systems Design	
ABEN 482	Instrumentation & Measurements	
ECE 483	Instrumentation for Engineers	
ME 412	Engineering Measurements	
ME 476	Mechatronics	
Part Two - Additional Courses		
3) Select 9 credits from the following: [1]		9
Artificial Intelligence & Machine Learning:		
IME 465	Introduction to Machine Learning	
ECE 477	Hardware Design for Machine Learning	
CSCI 425	Machine Learning	
CSCI 426	Introduction to Artificial Intelligence	
CSCI 436	Intelligent Agents	
CSCI 485	Autonomous Command and Artificial Intelligence for Robots and Other Cyber-Physical Systems	
CSCI 488	Human-Computer Interaction	
Perception & Data Processing		
ABEN 482	Instrumentation & Measurements	
ECE 444	Applied Digital Signal Processing	
ECE 448	Image Analysis I	
ECE 483	Instrumentation for Engineers	
ME 412	Engineering Measurements	
Electric Machines and Control Systems		
ECE 376	Embedded Systems	
ECE 461	Control Systems I	
ECE 463	Modern Control	
ECE 476	Advanced Embedded Systems	
ME 475	Automatic Controls	
ME 476	Mechatronics	
Kinematics & Dynamics of Machineries		
ABEN 478	Machinery Analysis & Design	

ABEN 479	Fluid Power Systems Design
ME 442	Machine Design I
ME 489	Vehicle Dynamics
Applications of Unmanned Systems	
ABEN 358	Electric Energy Application in Agriculture
ABEN 452	Bioenvironmental Systems Design
IME 437	Methods for Precision Manufacturing
IME 482	Automated Manufacturing Systems
PAG 115	Introduction to Precision Agriculture
PAG 315	Electronic Systems in Precision Ag
PAG 454	Applications of Precision Agriculture
CE 425	Bridge Evaluation and Rehabilitation
CE 452	Fundamentals of Oil & Gas Pipeline: Design, Operation, Inspection & Maintenance
Total Credits	**18**

[1]

Courses are grouped by interest area but the 9 credits can be from any of the areas.

Program Notes

- Any course used to satisfy *Part One: Core Courses* may not use that course to satisfy any of the nine credits for *Part Two: Approved Courses*.

Social Studies Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/social-science-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/social-science-education/)

Social studies involves the study of people and their interactions with each other, with their social and political institutions and with their environments. Accordingly, the social studies education major includes a broad range of courses and subjects. Teacher candidates are expected to demonstrate both breadth and depth of understanding in the academic disciplines that make up the social sciences.

The Program

Candidates in the social studies education major are prepared to teach a diverse curriculum to a diverse student population. The social studies education teacher candidate should work closely with an advisor to be sure that the general education courses taken will provide a strong foundation for the advanced courses in the major.

Professional Education Courses

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

Student Teaching

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

Student Advisement

An academic advisor works individually with social science education majors to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to seek their advisor's help whenever needed.

LICENSURE

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

Career Opportunities

There has been a surplus of social science teachers across the country for the past several years. It has been predicted that the surplus will continue. Students who elect to major in social science education should consider obtaining a second major or a teachable minor to enhance their employment prospects. In addition, students in social science education are encouraged to seek volunteer and employment experiences that complement their education. Summer or after-school work with special needs students, high school or middle school student activities, or other human service activities can provide the candidate valuable experience with children and adolescents.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	ENGL 120	3
ENGL 110	3	GEOL 106	3
HIST 101	3	GEOL 106L	1
SOC 110	3	HIST 102	3
Gen Ed Science & Technology	3	Gen Ed Quantitative Reasoning	3
Gen Ed Wellness	2	HIST Diversity & Inclusion in History	3
	17		**16**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 321	3	EDUC 322	3
HIST 103	3	HIST 104	3
GEOG/ECON/POLS Elective	3	GEOG/ECON/POLS Elective	3
HIST European History	3	HIST Widening Horizons	3
Gen Ed Science & Technology	3	HIST European History	3
Cultural Diversity Gen Ed	3	Apply to the School of Education	
Complete Core Academic Skills Exam or access your ACT+ scores			
	18		**15**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 451	3	EDUC 489	3
EDUC 475	2	GEOG/ECON/POLS Elective	3
ECON 201, POLS 115, or GEOG 151	3	GEOG/ECON/POLS Elective	3
GEOG/ECON/POLS Elective	3	HIST US 300-400 Elective	3
HIST Widening Horizons	3	Gen Ed Science & Tech w/ Lab	4
HIST US 300-400 Elective	3		
	17		**16**
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 481 (Social Sciences)	3	EDUC 485	1

EDUC 486	3	EDUC 487	9
HIST 390	3	EDUC 488	3
GEOG/ECON/POLS Elective	3		
GEOG/ECON/POLS Elective	3		
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
	15		**13**

Total Credits: 127

Social Studies Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/social-science-education/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/social-science-education/#planofstudytext)

Major Requirements

Major: Social Studies Education

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**
Category A: Humanities and Fine Arts †		**6**
Category B: Social and Behavioral Sciences †		**6**

Category W: Wellness †	**2**
Category D: Cultural Diversity *†	
Category G: Global Perspectives *†	
Total Credits	**39**

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Teaching Specialty Requirements		
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 390	Historical Research and Writing	3
Area Requirement - Select two of the following areas (A-C):		
Students must select two areas to complete for a total of 24 credits.		24
Area A - Political Science (12 credits):		
POLS 115	American Government	
Select 3 courses from the following:		
POLS 215	Problems and Policies In American Government	
POLS 216	Campaigns and Elections	
POLS 230	Judicial Process	
POLS 420	Political Behavior-Executive-Legislative Process	
POLS 421	Political Behavior-Political Parties	
POLS 422	State and Local Politics	
POLS 430	Constitutional Law-Civil Liberties	
POLS 431	Constitutional Law-Criminal Justice	
Area B - Geography (12 credits):		
GEOG 262	Geography of North America	
GEOL 106	The Earth Through Time	
Geography Electives	Take 6 credits of GEOG Electives	
Area C - Economics (12 credits):		
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	
Economics Electives	Take 6 credits of ECON Electives	
Specialized History Requirements from the following areas (D-G):		
Students must complete a total of 21 credits in specialized history courses. Select the minimum number of credits from each of the following categories:		21
D. US History (6 credits)*		
HIST 328	War and Society in America	
HIST 404	Digital History	
HIST 415	Public Memory and Memorialization in America	
HIST 420	Colonial American History	
HIST 421	Revolutionary America	
HIST 422	American Civil War and Reconstruction	
HIST 423	The Gilded Age and Progressive America	
HIST 424	U.S. History 1917-1960	
HIST 425	U.S. History 1917-Present II	

HIST 426	Women in American History	
HIST 431	The North American Plains	
HIST 434	Environmental History	
HIST 436	American Frontier to 1850	
RELS 240	"Cults" and New Religious Movements	
RELS 345	Church and State in America	
E. European History* (6 credits):		
HIST 320	History of Christianity	
HIST 450	Ancient History	
HIST 451	Medieval History	
HIST 454	Renaissance And Reformation	
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	
F. Widening Horizons* (6 credits):		
HIST 355	Global Islam	
HIST 381	Australia & New Zealand	
HIST 440	The Ottoman Empire	
HIST 473	Colonial Mexico	
HIST 475	The Aztec, Maya, and Inca	
HIST 477	Slavery in the Atlantic World	
HIST 480	History of Modern China from 1600	
HIST 481	History of Japan	
HIST 482	Vietnam: 125 Years of Conflict	
HIST 485	Cultural Exchange and the Making of the Modern World	
HIST 486	Plague! Tragedies and Triumphs of Globalization	
G. Diversity and Inclusion in History* (3 credits):		
HIST 135	Race in U.S. History	
HIST 271	Introduction to Latin American History	
HIST 280	History of East Asia to 1600	
HIST 281	History of East Asia from 1600	
HIST 320	History of Christianity	
HIST 415	Public Memory and Memorialization in America	
HIST 426	Women in American History	
HIST 440	The Ottoman Empire	
HIST 473	Colonial Mexico	
HIST 475	The Aztec, Maya, and Inca	
HIST 477	Slavery in the Atlantic World	
HIST 480	History of Modern China from 1600	
HIST 481	History of Japan	
HIST 482	Vietnam: 125 Years of Conflict	
HIST 484	Cultures and Civilizations of the Pre-modern World	
HIST 485	Cultural Exchange and the Making of the Modern World	
HIST 486	Plague! Tragedies and Triumphs of Globalization	
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 475	Reading in the Content Area	2
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		**93**

*
None of these courses can be double counted with another history requirement.

Degree Requirements and Notes

- A grade of 'C' or better is required in all Professional Education Requirement courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.
- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- See School of Education (https://www.ndsu.edu/education/) for admission requirements.

Social Work & Human Development and Family Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/hdfs/ (http://www.ndsu.edu/hdfs/)
- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/social-work-human-development-family-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/social-work-human-development-family-science/)

The dual-degree program in human development and family science and social work offers students an integrated knowledge of children, adolescents, adults and families across the life span that will prepare them for careers in the helping professions. Students will gain a broad range of knowledge and skills that will equip them to address the needs and aspirations of people living in a changing world and be eligible for North Dakota licensure as social workers.

The Program

Students are concurrently enrolled in the **family science** or **adult development and aging** option of human development and family science (HDFS) at North Dakota State University and the social work major through Minot State University (MiSU). The culmination of these requirements leads to a Bachelor of Science from NDSU as well as a Bachelor of Social Work from MiSU.

Under a cooperative agreement, students remain on the NDSU campus to complete all course work for the dual degree. The courses specific to the social work major are offered on the NDSU campus by MiSU faculty or offered through interactive video.

Together the HDFS degree and the social work degree complement and strengthen the knowledge and skills that students will possess upon completion of this dual degree program. The curriculum combines course work in human development and family science with course work in social work. The curriculum includes a strong liberal arts base, studies in human development, family science, social work practice, social welfare, human behavior and research, and additional course work in economics, psychology, sociology and political science.

Selective Admission

Admission to the dual degree program consists of two separate university applications:

1. Application for admission to NDSU for the human development and family science/social work dual degree prior to beginning the program,
2. After admission and enrollment at NDSU and after meeting with an advisor, application for admission to Minot State University, and
3. Upon completion of specific requirements, application for admission to MiSU social work program.

Field Education

Students are required to complete 400 hours of direct practice with either a public or private human service agency. This supervised field practice enables students to gain valuable hands-on experience working with clients.

The social work program does not give academic credit for life experience or work experience, nor does the program allow such experience to be substituted for field education.

Financial Aid and Scholarships

The Office of Financial Aid and Scholarships at NDSU makes available grants, loans, scholarships and work-study employment. Scholarships also are available through the College of Health and Human Sciences. For more information visit Scholarships (https://www.ndsu.edu/onestop/scholarships-grants-and-tuition-waivers/) on the One Stop website.

The Facilities

Facilities for the dual degree program are housed in Evelyn Morrow Lebedeff Hall and the Family Life Center.

Extra-Curricular Opportunities

Students may enhance their involvement by participating in groups such as the HDFS Club and/or the Student Social Work Organization.

Community Setting

The Fargo-Moorhead metropolitan area offers a setting conducive to study. Students have the opportunity to work in a number of community institutions serving children and families.

Accrediting Agency

The social work program is accredited by: Council on Social Work Education, 1701 Duke Street, Suite 200, Alexandria, VA 22314-3457.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110		3	COMM 110	3
HDFS 242		3	ENGL 120	3
PSYC 111		3	POLS 115 or 215	3
Gen Ed Science & Technology		3	SOC 110	3
Gen Ed Humanities/Fine Arts		3	HDFS 230	3
		15		**15**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
HDFS 250		3	ECON 105, 201, or 202	3
PHIL 210		3	HDFS option course (Family or Aging)*	3
PSYC 212		3	Gen Ed Science & Technology with Lab	4
SWK 250: Interpersonal Skills		3	SWK 330: Human Behavior & Soc Env	3
SWK 256: Development of Social Welfare		3	SWK 335: Methods I - Individuals	3
Gen Ed Science & Tech		3		
		18		**16**
Junior				
Fall	**Credits**		**Spring**	**Credits**
HDFS 275		3	STAT 330	3
PSYC 270		3	HDFS Any Level Elective	3

HDFS Option Course (Family or Aging)*	3	SWK 426: Methods II - Groups	3
SWK 331: Family Dynamics	3	SWK 402, 428, 430 or HMS 279	3
SWK 430 or HMS 279	3	Gen Ed Humanities/Fine Arts	3
	15		**15**

Senior

Fall	Credits	Spring	Credits
HDFS 353	3	HDFS 496**	1
HDFS 390	1	SWK 490 Field Education	12
ENGL 320, 325, 358, or 459	3	SWK 491 Senior Seminar	3
HDFS Option Course (Family or Aging)*	3		
HDFS 300- or 400-level elective	3		
SWK 427: Methods III - Organizations	3		
	16		**16**

Total Credits: 126

*

Adult Development & Aging option courses are HDFS 360, 480 (offered odd falls), 482 (offered even falls); Family Science option courses are HDFS 341, 357, 462

**

Students should NOT enroll themselves in HDFS 496 via Campus Connection. The NDSU Registration and Records office automatically enrolls students in the course during the student's teaching semester.

Social Work & Human Development and Family Science Dual Degree Program with Minot State Universtiy

Department Information

- **Department Web Site:**
  www.ndsu.edu/hdfs/ (http://www.ndsu.edu/hdfs/)
- **Credential Offered:**
  B.S.; B.A.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/social-work-human-development-family-science/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/social-work-human-development-family-science/#planofstudytext)

Major Requirements

Major at NDSU: Human Development & Family Science
Major at MSU: Social Work

Degree Type: B.A. or B.S.
Minimum Degree Credit to Graduate: 127

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.

7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Human Development & Family Science Core Requirements		
Select one of the following: [1]		3
ECON 105	Elements of Economics	
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	
Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
HDFS 230	Life Span Development	3
HDFS 242	Couples, Marriages and Families	3
HDFS 250	Introduction to Research Methods in Human Development and Family Sciences [2]	3
HDFS 275	Diversity and Multiculturalism in Individual and Family Life [2]	3
HDFS 353	Children, Families and Public Policy [2]	3
HDFS 390	Career Development	1
HDFS Elective	(HDFS 196 and HDFS 496 may not be used)	3
HDFS 300/400	300/400 Level Elective (HDFS 496 may not be used)	3
PHIL 210	Ethics [1]	3
POLS 115	American Government [1]	3
or POLS 215	Problems and Policies In American Government	
PSYC 111	Introduction to Psychology [1]	3
PSYC 212	Psychological Aspects of Drug Use and Abuse [2]	3

PSYC 270	Abnormal Psychology [2]	3
SOC 110	Introduction to Sociology [1]	3
STAT 330	Introductory Statistics [2]	3
SWK 250	Interpersonal Skills [1]	3
SWK 256	Development of Social Welfare [1]	3
SWK 330	Human Behavior and the Social Environment	3
SWK 331	Family Dynamics	3
SWK 335	Social Work Methods I	3
SWK 426	Social Work Methods II	3
SWK 427	Social Work Methods III	3
SWK 430	Diversity, Oppression, and Social Change	3
SWK Elective	Directed Elective	3
SWK 490 & 491	Field Education & Senior Seminar (to be taken in the same semester) & HDFS 496: Field Experience (1 cr.)	16
Option Requirement		
Select either the Family Science or Adult Development & Aging option listed below		9
Total Credits		**101**

Family Science Option

Code	Title	Credits
HDFS 341	Parent-Child Relations	3
HDFS 357	Personal and Family Finance	3
HDFS 462	Methods of Family Life Education	3
Total Credits		**9**

Adult Development and Aging Option

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

1

Denotes a prerequisite course that is required to be completed for admission to the Social Work program. (ENGL 110, ENGL 120, COMM 110, PHIL 210, ECON 105, 201 or 202, POLS 115 or 215, PSYC 111, SOC 110, SWK 250, and SWK 256.)

2

No substitutions allowed.

Degree Requirements and Notes

- A grade of C or better is required for all HDFS and SWK prefix courses, regardless of whether they are used for the major core, major electives, general education, or free electives.
- A 2.50 cumulative GPA is required in major courses for graduation.
- Course taken *Pass/Fail* cannot be used to satisfy any requirements other than total credits.

Sociology

Department Information

- **Department Web Site:**
  www.ndsu.edu/socanth/ (http://www.ndsu.edu/socanth/)
- **Credential Offered:**
  B.S.; B.A.; Minor

- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/sociology/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/sociology/)

Sociology is the study of human social interaction and social organizations. Sociologists study social change, diverse communities and their interactions, and use scientific methods to find empirical answers to complex social questions. Studying sociology fosters creativity, innovation, critical thinking, analytic problem solving, and communication skills. Sociology majors are employed in a variety of business, nonprofit, and government jobs.

The Program

Sociologists attempt to develop a better understanding of the way society works. They examine social relationships in institutions like the family, religion, the economy, health care, media, education and government. Sociology majors develop applied research and analytical skills and a perspective that prepares them to address social concerns. Courses are offered on campus and online. North Dakota State University offers graduate work leading to a master's degree and frequently has students who pursue doctorates at other universities.

Faculty and Facilities

The faculty in sociology have varying research interests and areas of specialization. The sociology faculty provide expertise in areas such as gender, research methods, social psychology, education, social inequality, religion, and community development. They employ survey, ethnographic, and experimental design methods. The department contains two social research laboratories.

Career Opportunities

Sociological expertise can be useful in careers that involve community service, research analysis, non-profit organizations, human and social services, urban and regional planning, population analysis, economic or marketing studies, health-related industries, agricultural and rural life advocacy, government administration, and policy research. For more information on sociology employment, refer to the North Dakota State University Sociology website or visit the American Sociological Association website at https://www.asanet.org.

Internship Program

Students in sociology may apply for the internship program. Students typically complete internships during their junior or senior year. Internship opportunities exist in many agencies in North Dakota and Minnesota and can be done any time during the calendar year. Students who complete internships are able to combine the theoretical and applied aspects of professional preparation. Our students have worked in a variety of settings including human and social services, volunteer agencies, community development, business and industry.

The Curriculum

Sociology students explore their interests within the program, including social psychology, social inequality, community development, applied sociology, environmental sociology, gerontology, and gender issues, by taking classes in the areas of their choice.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ANTH 111 or 206[1]	3	COMM 110	3
SOC 110, 115, or 116[1]	3	ENGL 120	3
ENGL 110	3	Gen Ed Humanities/Fine Arts & Global Perspectives	3
Gen Ed Science/Technology w/ Lab	4	Gen Ed Quantitative Reasoning	3
Gen Ed Wellness	2	Free Elective	3
	15		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
SOC 214[1]	3	SOC 410[1]	3
Gen Ed Science/Technology	3	SOC 298	1
Free Electives	9	Gen Ed Science/Technology	3

		Gen Ed Humanities/Fine Arts & Cultural Diversity	3
		Free Electives	6
	15		**16**

Third Year

Fall	Credits	Spring	Credits
SOC 340[1]	3	SOC 422[1]	3
SOC 470[1]	3	Sociology Major Electives (See curriculum)	3
Sociology Major Elective (see curriculum)	3	Free Electives	9
Gen Ed Upper Level Writing	3		
Free Elective	3		
	15		**15**

Fourth Year

Fall	Credits	Spring	Credits
SOC 494 or 496	1	Sociology Major Elective (see curriculum)	3
Sociology Major Elective (see curriculum)	3	Free Electives	12
Free Electives	10		
	14		**15**

Total Credits: 120

1

Requires a grade of C or higher.

Sociology

Department Information

- **Department Web Site:**
  www.ndsu.edu/socanth/ (http://www.ndsu.edu/socanth/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/sociology/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/sociology/#planofstudytext)

Major Requirements

Major: Sociology

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.

7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Sociology Core Requirements		
ANTH 111	Introduction to Anthropology *	3
or ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
SOC 110	Introduction to Sociology *	3
or SOC 115	Social Problems	
or SOC 116	Global Social Problems	
SOC 214	Social Interaction *	3
SOC 298	Professional Seminar	1
SOC 340	Social Research Methods *	3
SOC 410	Social Inequality *	3
SOC 422	Development Of Social Theory *	3
SOC 470	Social Data Analysis *	3
SOC 494	Individual Study *	1
or SOC 496	Field Experience	
Major Electives		
Select an additional 12 credits from the electives listed below:		12
SOC 233	Sociology of Organizations and Work	
SOC 235	Cultural Diversity	
SOC 240	Gender and Popular Culture	
SOC 401	Sociology of Religion	
SOC 405	Community Development	
SOC 407	Deviant Behavior	
SOC 412	Sociology of Gender	

SOC 416	Sociology Through Literature
SOC 417	Sociology of the Family
SOC 418	Social Psychology
SOC 424	Feminist Theory and Discourse
SOC 425	Sociology of Culture
SOC 426	Sociology of Medicine
SOC 431	Environmental Sociology
SOC 439	Social Change
SOC 440	Sociology of Aging
SOC 441	Death and Dying
Total Credits	**35**

*
A grade of 'C' or better is required in all of the Core Requirements for the major.

Minor Requirements

Minor: Sociology

Required Credits: 18

Code	Title	Credits
Core Courses		
ANTH 111	Introduction to Anthropology	3
or ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
SOC 110	Introduction to Sociology	3
or SOC 115	Social Problems	
or SOC 116	Global Social Problems	
Select two of the following:		6
SOC 214	Social Interaction	
SOC 233	Sociology of Organizations and Work	
SOC 340	Social Research Methods	
SOC 410	Social Inequality	
SOC 422	Development Of Social Theory	
SOC 470	Social Data Analysis (This course is going through approvals and should be officially listed soon.)	
Minor Electives: Select any two SOC prefix courses at the 300-400 level		6
Total Credits		**18**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Emergency Management majors who wish to complete this minor must complete 9 unique sociology credits (i.e. courses that were not completed for the major of EM).

Soil Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/snrs/ (http://www.ndsu.edu/snrs/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/soil-science/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/soil-science/)

Soil Science is the study of the soil as a component of natural and man-made systems. It is the key factor in food production and is at the forefront of environmental and natural resource issues such as land use, soil contamination, ground water quality, and waste disposal. Offered as a minor program of study only.

Soil Science

Department Information

- **Department Web Site:**
  www.ndsu.edu/snrs/ (http://www.ndsu.edu/snrs/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/soil-science/ (http://catalog.ndsu.edu/programs-study/undergraduate/soil-science/)

Minor Requirements

Minor: Soil Science

Required Credits: 18

Code	Title	Credits
Required Courses		
SOIL 210	Introduction to Soil Science	3
SOIL 322	Soil Fertility and Fertilizers	3
SOIL 444	Soil Genesis and Survey	3
Elective Courses		
Select three of the following:		9
SOIL 264	Natural Resource Management Systems	
SOIL 351	Soil Ecology	
SOIL 410	Soils and Land Use	
SOIL 433	Soil Ecohydrology and Physics	
SOIL 447	Microclimatology	
SOIL/NRM/RNG 454	Wetland Resources Management	
SOIL 465	Soil And Plant Analysis	
Total Credits		**18**

Minor Requirements and Notes:

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

Software Development

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/software-development/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/software-development/)

The Software Development certificate is intended for students who wish to build their development expertise. This certificate can be useful for students in other majors who are interested in a software development career. It is also suitable for students who previously completed a degree in a different major and wish to apply to our graduate programs but do not yet have software development experience. Programming knowledge equivalent to the Computer Science Foundations certificate is expected.

Software Development

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/software-development/ (http://catalog.ndsu.edu/programs-study/undergraduate/software-development/)

Certificate Requirements

Software Development

Required Credits: 9

Required Courses

Code	Title	Credits
CSCI 213	Modern Software Development	3
CSCI 313	Software Development with Frameworks	3
CSCI 371	Web Scripting Languages	3
or CSCI 412	Mobile Software Engineering	
Total Credits		**9**

Software Engineering

Department Information

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  B.S.; UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/software-engineering/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/software-engineering/)

Students interested in working as software engineers must have a sound foundation of math, physics, software, circuit theory, and engineering design principles to function effectively. A bachelor of science (B.S.) degree with a major in software engineering is focused on preparing individuals to work with other IT professional and apply engineering principles to design, test, implement, and evaluate software. Software engineers are an integral part of the accelerating growth of technology, are knowledgeable on the ever-increasing complexity of the IT sector, and are meeting the growing demands of customer and innovative website and mobile applications, and the continuous need to update code due to its limited lifespan. Software Engineering is offered jointly by the Computer Science department and the Electrical & Computer Engineering department in the College of Engineering.

For students with substantial computer science training, the Computer Science Department offers a certificate with focus on software engineering. The certificate draws from the set of courses that are specific to the B.S. in Software Engineering and the Software Engineering track of our B.S. in Computer Science degree. It can be of interest to professionals with computer science degrees who wish to expand their expertise in the area of software engineering. It is also targeted at current students who complete a different track or program and wish to cover more than one specialization.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
CHEM 121	3	CHEM 121L or PHYS 251L	1
ECE 111	3	CSCI 160	4
ENGL 110	3	ECE 275	4

Gen Ed Social & Behavioral Sci	3	ENGL 120	3
Gen Ed Wellness	2	MATH 165	4
	14		**16**

Second Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	ECE 374	4
CSCI 161	4	MATH 265	4
EE 206	4	MATH 129	3
MATH 166	4	STAT 330	3
		Gen Ed Social and Behavioral Sci	3
	15		**17**

Third Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 213	3	CSCI 313	3
CSCI 222	3	CSCI 372	3
ECE 376	4	ECE 341	3
PHYS 251	4	ECE 401	1
Gen Ed Humanities and Fine Arts	3	ENGL 320 or 324	3
		Tech Elective	3
	17		**16**

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 305	3	ECE 405	3
CSCI 366	3	ECE 479	3
CSCI 413	3	ENGR 327	3
ECE 403	2	Tech Elective	6
ECE 474	3		
	14		**15**

Total Credits: 124

Sample Program Guide

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First Year			
Fall	**Credits**	**Spring**	**Credits**
CHEM 121[2]	3	CHEM 121L or PHYS 251L (GE Lab)	1
ENGL 110	3	CSCI 160	4
ECE 111	3	ECE 275	4
Gen Ed Wellness	2	ENGL 120	3
Gen Ed Social & Behavioral Science	3	MATH 165	4
	14		**16**

Second Year				
Fall	**Credits**		**Spring**	**Credits**
COMM 110		3	ECE 374	4
CSCI 161		4	MATH 265	4
EE 206		4	MATH 129	3
MATH 166		4	STAT 330	3
			Gen Ed Humanities and Fine Arts	3
		15		**17**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
CSCI 213		3	CSCI 313	3
CSCI 222		3	CSCI 372	3
ECE 376		4	CSCI 416	3
PHYS 251		4	ECE 341	3
Gen Ed Social & Behavioral Sci		3	ENGL 320 or 324	3
		17		**15**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
CSCI 305		3	CSCI 419	3
CSCI 366		3	CSCI 445	3
CSCI 413		3	ECE 479	3
ENGR 327		3	Tech Elective	3
Tech Elective		3	Tech Elective	3
		15		**15**

Total Credits: 124

Software Engineering

Department Information

- **Department Location:**
  258 Quentin Burdick Building
- **Department Phone:**
  701-231-8562
- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Credential Offered:**
  B.S.; UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/software-engineering/ (http://catalog.ndsu.edu/programs-study/undergraduate/software-engineering/)

Major Requirements

Major: Software Engineering

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.

3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

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Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Software Engineering Requirements

Code	Title	Credits
Major Requirements		
ECE 111	Introduction to Electrical and Computer Engineering	3
ECE 275	Digital Design	4
ECE 341	Random Processes	3
ECE 374	Computer Organization	4
ECE 376	Embedded Systems	4
EE 206	Circuit Analysis I	4
ECE 479		3
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 213	Modern Software Development	3
CSCI 222	Discrete Mathematics	3
CSCI 313	Software Development with Frameworks	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3
CSCI 305	Principles of Cybersecurity	3
CSCI 413	Principles of Software Engineering	3
CHEM 121	General Chemistry I	3
or BIOL 111	Concepts of Biology	

MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
PHYS 251	University Physics I	4
STAT 330	Introductory Statistics	3
Technical Electives		
Tech Electives: Any 300/400 level CSCI or ECE courses not listed above.		9
Software Engineering Track		
Select either Systems Programming or Applications Development		12
Total Credits		**100**

Systems Programming Track

Code	Title	Credits
ECE 401	Design I	1
ECE 403	Design II	2
ECE 405	Design III	3
ECE 474	Computer Architecture	3
ENGR 327	Ethics, Engineering, and Technology	3
Total Credits		**12**

Applications Development Track

Code	Title	Credits
CSCI 416	Software Architecture and Design	3
CSCI 419	Software Testing and Debugging	3
CSCI 445	Software Projects Capstone	3
ENGR 327	Ethics, Engineering, and Technology	3
Total Credits		**12**

Certificate Requirements

Software Engineering

Required Credits: 9

Required Courses

Code	Title	Credits
CSCI 413	Principles of Software Engineering	3
CSCI 419	Software Testing and Debugging	3
Select one course from the following:		3
CSCI 416	Software Architecture and Design	
CSCI 450	Cloud Computing	
CSCI 473	Foundations of the Digital Enterprise	
CSCI 488	Human-Computer Interaction	
Total Credits		**9**

Spanish

Department Information

- **Department Web Site:**
  www.ndsu.edu/modernlanguages/ (http://www.ndsu.edu/modernlanguages/)
- **Credential Offered:**
  B.S.; B.A.; Minor

- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/spanish/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/spanish/)

Spanish is spoken in 28 countries by over 740 million people, and the US is now the second largest Spanish-speaking country in the world. In today's global economy, learning to speak Spanish is an extremely valuable skill, both in the United States and abroad. In this program, you will learn to effectively speak, read, and write in Spanish, with courses in conversation, reading comprehension, Spanish for business, Spanish for the healthcare professions, culture, and literature. Our curriculum will also help you develop what employers call desirable "soft skills" such as creativity, mental flexibility, critical thinking, and intercultural communication strategies. The Spanish major can easily pair with another major, a number of minors, or teaching certification.

Career Directions

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.

Students who declare a Spanish major or minor find it to be incredibly useful when combined with preparation in another professional field. Examples include healthcare, 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 Spanish language skills are finding increased opportunities with multinational corporations, especially in management and marketing. Regardless of their specific majors, students are encouraged to contact the Spanish Program for information and advice on career application of Spanish.

Students wishing to prepare for high school teaching should make this intention known to the School of Education and to the Spanish Program to make certain that the requirements for state certification are met. Competitiveness and flexibility in the job market tend to be greater if certification can be obtained in two or more different areas.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	3	ENGL 120	3
SPAN 311	3	SPAN 312	3
Gen Ed Quantitative Reasoning	3	COMM 110	3
Gen Ed Social and Behavioral Sciences	3	Gen Ed Science/Tech	3
Gen Ed Wellness	2	Free Elective	3
	14		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
One year of a Second Language Course	3-4	One year of a Second Language Course	3-4
Gen Ed Science/Tech	3	SPAN 401 or 402 (Advanced Language)	3
SPAN 330 or 331 (Civilization)	3	Gen Ed Social and Behavioral Sciences	3
Free Electives	6	Free Electives	6
	15-16		**15-16**

Third Year				
Fall	**Credits**		**Spring**	**Credits**
SPAN 450, 451, 452, or 453 (Peninsular Literature)		3	SPAN 492 ([14+ weeks] Upper-division Courses Approved by Advisor)	1-15
Additional SPAN Course		3		
Gen Ed Upper-Division Writing		3		
Gen Ed Science/Tech with Lab		4		
Free Elective		3		
		16		**14**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
SPAN 440, 441, 442, or 443 (Spanish American Literature)		3	SPAN 489 (Senior Thesis)*	1
Additional SPAN Course		3	Additional SPAN Course	3
Free Electives		9	Free Electives	12
		15		**16**

Total Credits: 120-122

*
SPAN 489: Senior Thesis must be completed after the study abroad experience.

Spanish

Department Information

- **Department Web Site:**
  www.ndsu.edu/modernlanguages/ (http://www.ndsu.edu/modernlanguages/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/spanish/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/spanish/#planofstudytext)

Major Requirements

Major: Spanish

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

A minimum grade of 'B' is required for all SPAN prefix courses counted for the Spanish major.

Code	Title	Credits
Spanish Major Core Requirements		
SPAN 311	Spanish Conversation and Composition I	3
SPAN 312	Spanish Conversation and Composition II	3
Advanced Language:		
SPAN 401	Advanced Spanish Grammar and Writing (May satisfy a general education category C)	3
or SPAN 402	Advanced Spanish Conversation	
Civilization and Culture:		
Take two from the following with at least one of the two courses being a SPAN prefix:		6
SPAN 330	Introduction to Spanish Civilization	
SPAN 331	Introduction to Spanish American Civilization	
HIST 271	Introduction to Latin American History	
HIST 464	Imperial Spain	
HIST 473	Colonial Mexico	
HIST 475	The Aztec, Maya, and Inca	
ANTH 446	Anthropology of Latin America	
ANTH 478	History and Cultures of the Caribbean	
Spanish American & Pennisular Literatures:		
Select two courses from the following:		6
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	

Spanish Electives:		
Select from the following and any Spanish course not used above (all MUST be SPAN prefix):		12
SPAN 301	Spanish for Business	
SPAN 303	Spanish for Health Care	
SPAN 403	Advanced Spanish for Health Care	
SPAN 332	Introduction to Hispanic Cinema	
SPAN 430	Approaches to Literature	
Study Abroad and Capstone Experience:		
SPAN 492	Global Practicum: Study Abroad (Requires a minimum of one semester-14 weeks at the 300+ level in a program pre-approved by the Modern Languages Dept.)	1-15
SPAN 489	Senior Thesis (Consult dept/adviser semester before enrolling)	1
Total Credits		**35-49**

Degree Notes:

- Of the 31 credits of Spanish Language courses (SPAN) required for the Spanish major, 18 must be NDSU resident credits in addition to the capstone (i.e. cannot be taken Tri-College or study abroad).

Minor Requirements

Minor: Spanish

Required Credits:18

A minimum grade of 'B' is required for all courses used for the Spanish minor.

Code	Title	Credits
Minor Core Requirements		
SPAN 311	Spanish Conversation and Composition I	3
SPAN 312	Spanish Conversation and Composition II	3
SPAN 330	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 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 below or above on this guide not previously taken.		**3**
SPAN 301	Spanish for Business	
SPAN 303	Spanish for Health Care	
SPAN 332	Introduction to Hispanic Cinema	
SPAN 403	Advanced Spanish for Health Care	
Total Credits		**18**

Minor Requirements and Notes

- A minimum of 9 credits for the minor must be taken at NDSU and through Tri-College or while studying abroad.

Spanish Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/spanish-education/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/spanish-education/)

Spanish Education involves learning about Spanish language and culture, while simultaneously developing knowledge and skills related to teaching. Your classes will be a blend of content courses related to the language, as well as teaching courses.

The Program

Candidates in the Spanish education major are prepared for a language teaching career by getting the best of both worlds: content courses with faculty in the Department of Modern Languages and professional education courses from faculty in the School of Education (SOE). In addition to required courses, Spanish education teacher candidates need to study abroad where the target language is spoken. A degree in Spanish education will prepare teacher candidates to teach Spanish at the 5-12 level.

Professional Education Courses

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

Student Teaching

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

Student Advisement

Students will be assigned individual advisors who will work closely in program planning and in other ways to advise and assist them. Students are encouraged to seek advising from both Modern Languages and the School of Education whenever needed.

Licensure

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

Career Opportunities

The demand for language teachers continues to be great. In general, "employment of high school teachers is projected to grow 8 percent from 2016-2026, about as fast as the average for all occupations. Rising student enrollment should increase demand for high school teachers, but employment growth will vary by region" (https://www.bls.gov/ooh/education-training-and-library/high-school-teachers.htm)

Sample Program Guide

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First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	3	COMM 110	3
Gen Ed Wellness	2	EDUC 321	3

Gen Ed Humanities/FA		3	ENGL 120		3
Gen Ed Social & Behavioral Science		3	Gen Ed Humanities/FA		3
Gen Ed Quantitative Reasoning		3	Gen Ed Science & Technology		3
Free Elective		3	Complete Core Academic Skills Exam or access your ACT+ scores		
		17			**15**
Second Year					
Fall	**Credits**		**Spring**	**Credits**	
EDUC 322		3	EDUC 451		3
SPAN 311		3	SPAN 312		3
Gen EdScience & Technology		3	SPAN 401 or 402		3
Spanish American & Peninsular Lang		3	Spanish American & Peninsular Lang		3
Spanish Civilization & Culture		3	Free Electives		3
Apply to the School of Education					
		15			**15**
Third Year					
Fall	**Credits**		**Spring**	**Credits**	
EDUC 481		2-3	SPAN 492		15
EDUC 489		3			
SPAN Elective		3			
SPAN Elective		3			
Gen Ed Science & Technology with lab		4			
		15-16			**15**
Fourth Year					
Fall	**Credits**		**Spring**	**Credits**	
EDUC 475		2	EDUC 485		1
EDUC 486		3	EDUC 487		9
SPAN 489		1	EDUC 488		3
Gen Ed Social & Behavioral Science		3			
SPAN Elective		3			
SPAN Elective		3			
Apply for Student Teaching					
Complete PLT (grades 7-12) Exam					
Complete Subject Area Assessment Exam					
		15			**13**

Total Credits: 120-121

Spanish Education

Department Information

- **Department Web Site:**
  www.ndsu.edu/education/ (http://www.ndsu.edu/education/)
- **Credential Offered:**
  B.S.; B.A.

- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/spanish-education/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/spanish-education/#planofstudytext)

Major Requirements

Major: Spanish Education

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Code	Title	Credits
Teaching Specialty Requirements		
SPAN 311	Spanish Conversation and Composition I	3
SPAN 312	Spanish Conversation and Composition II	3
Civilization and Culture		
Must take two from the following with at least one of the two course being a Spanish prefix:		6
SPAN 330	Introduction to Spanish Civilization	
SPAN 331	Introduction to Spanish American Civilization	
HIST 271	Introduction to Latin American History	

HIST 464	Imperial Spain	
HIST 473	Colonial Mexico	
HIST 475	The Aztec, Maya, and Inca	
ANTH 446	Anthropology of Latin America	
ANTH 478	History and Cultures of the Caribbean	
Advanced Language:		
SPAN 401	Advanced Spanish Grammar and Writing	3
or SPAN 402	Advanced Spanish Conversation	
Spanish American and Peninsular Literatures:		
Select two of the following:		6
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	
Electives:		
Choose from the following or any other Spanish courses not used above (all MUST be a Spanish prefix):		12
SPAN 301	Spanish for Business	
SPAN 303	Spanish for Health Care	
SPAN 403	Advanced Spanish for Health Care	
SPAN 332	Introduction to Hispanic Cinema	
SPAN 430	Approaches to Literature	
Study Abroad & Capstone Experience:		
SPAN 492	Global Practicum: 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
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Lang)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		**66-80**

Degree Requirements and Notes

- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A grade of 'B' or better is required in all SPAN teaching specialty courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.
- Of the 31 credits of Spanish Language courses (SPAN) required for the Spanish major, 18 must be NDSU resident credits in addition to the capstone (i.e. cannot be taken Tri-College or study abroad).
- Courses taken *Pass/Fail* will not be used to satisfy any requirement other than total credits for graduation.
- See School of Education (https://www.ndsu.edu/education/) for admission requirements.

Spanish Studies

Department Information

- **Department Web Site:**
  www.ndsu.edu/modernlanguages/ (http://www.ndsu.edu/modernlanguages/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/spanish-studies/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/spanish-studies/)

Broader in scope than the traditional minor which emphasizes linguistic competence, the Spanish Studies minor combines systematic language study with courses in geography, history, civilization, and politics to enhance students' understanding of the global context of the language they have chosen to study. A languages studies minor requires 18 approved semester credits, including nine credits of language and civilization study beyond the intermediate level (SPAN 311, SPAN 312 and a civilization course in the language), a six-credit sequence in history, and an approved three-credit elective in Anthropology, Geography, or Political Science; study abroad is strongly encouraged.

Spanish Studies

Department Information

- **Department Web Site:**
  www.ndsu.edu/modernlanguages/ (http://www.ndsu.edu/modernlanguages/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/spanish-studies/ (http://catalog.ndsu.edu/programs-study/undergraduate/spanish-studies/)

Minor Requirements

Minor: Spanish Studies

Required Credits: 18

Code	Title	Credits
Spanish Studies Core Requirements		
SPAN 311	Spanish Conversation and Composition I	3
SPAN 312	Spanish Conversation and Composition II	3
SPAN 330	Introduction to Spanish Civilization	3
or SPAN 331	Introduction to Spanish American Civilization	
SPAN 330 or SPAN 331 may be completed through study abroad.		
History Electives		
Must be a sequence. Or a history sequence appropriate to student's area of study.		
HIST 101	Western Civilization I	3
HIST 102	Western Civilization II	3
Additional Electives: Select one of the following:		**3**
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
GEOG 151	Human Geography	
GEOG 161	World Regional Geography	
POLS 220	International Politics	
SPAN 492	Global Practicum: Study Abroad	
Total Credits		**18**

Minor Requirements and Notes

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

Sport Coaching

Department Information

- **Department Web Site:**
  ndsu.edu/hpe/ (http://ndsu.edu/hpe/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/programs-curriculum/sport-coaching/ (http://catalog.ndsu.edu/undergraduate/programs-curriculum/sport-coaching/)

The sport coaching certificate will provide students with a foundation in best practices in sport coaching. Certificate completers will be prepared to work with youth, collegiate, and adult athletes.

Sport Coaching

Department Information

- **Department Web Site:**
  https://www.ndsu.edu/hpe/
- **Credential Offered:**
  UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/sport-coaching (http://catalog.ndsu.edu/programs-study/undergraduate/sport-coaching/)

Certificate Requirements

Certificate: Sport Coaching

Minimum Required Credits: 10

Code	Title	Credits
HPER 211	Successful Coaching	1
HPER 255	Professional Preparation in Middle School Physical Education	3
HPER 349	Advanced Coaching	3
HPER 336		3
Total Credits		**10**

Sport Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/hnes/ (http://www.ndsu.edu/hnes/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/sport-management/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/sport-management/)

The sport management (SM) major is a four-year, full-time program of study that is designed to prepare students to excel in the sport industry. SM students are guided through coursework and hands-on experiences within the sport industry that allow each student to focus on the ever-changing intricacies of the sport environment from multiple contexts. Within the curriculum, students are encouraged to explore the area(s) of sport they are most interested in, ranging anywhere from local non-profits to national and international professional franchises.

The Program

The SM degree is designed to prepare students for employment in local, state, regional, national or international level sporting and recreation organizations. The curriculum covers 75 credit hours in total and includes a Minor in Business Administration (24 credits) to enhance the employment prospect for each student.

Career Preparation

NDSU SM graduates are employed in a variety of sport and recreation occupations. Graduates should expect to work in local, state, regional, national or international level organizations, business, and nonprofits. Additionally, with the opening of the new eSports lab on campus, we have worked closely to ensure students with an interest with eSports are able to explore the industry with professionally-outfitted equipment and through educational opportunities.

In light of the interdisciplinary nature of our program study options, career opportunities beyond the sport management or recreation management fields are feasible.

Sport Management Association

The Sport Management Association (SMA) provides students with an opportunity to build relationships with peers and industry leaders in sport and recreation. Organization members can take part in sports-oriented community projects, learn about different sport and recreation careers from area professionals and become further prepared for a career in the industry. The SMA holds meetings regularly, with dues-paying members eligible for the many planned activities, adventures, and feasts scheduled by the association.

Academic Requirements

The 100- and 200-level sport management courses (usually taken during the freshman and sophomore years) are designed to prepare students for additional undergraduate work in the subsequent sport management courses during their junior and senior years (see the Sample Program Guide). It is highly recommended all students review the student handbook and all communications from the SM program coordinator and academic advisors regarding the sport management academic requirements.

To be eligible to take upper-division sport management classes (with the exception of HNES 303 and HNES 323), a student must:

- Have reached 50 credits in total,
- Have a grade of B or better in HNES 190,
- Complete one passing credit of HNES 192,
- Successfully complete ECON 105 and ACCT 102 with a collective GPA of 2.5 or higher across both classes (a student CANNOT receive a D in either course),
- Earn a minimum cumulative GPA of 2.75 for all classes by the end of the sophomore year (reaching 50 credits minimum).

Internship

The SM internship is the capstone course for all SM majors. Students participating in an internship will complete 12 credits, with each credit requiring 43 hours of documented work at an internship site (totaling 516 hours of on-the-job experience). The internship can be repeated at various sites/organizations at their advisor's discretion. Securing a host organization outside North Dakota or the United States is not only possible but encouraged.

Students have completed internship hours in several areas across sport, including but not limited to: Air Force Academy Athletics, Arizona State University Athletics, Bismarck Larks, Fargo and West Fargo Parks and recreation departments, Fargo-Moorhead RedHawks, Fargo Youth Hockey, Great Rides Fargo, Iowa Cubs, Minnesota Twins, Minnesota Vikings, NDSU Athletics, Oklahoma State University Athletics, Saint Paul Saints, Scheels Arena, Southern Texas PGA, US Olympic Committee, Vanderbilt University athletics, Washington Spirit, and the YMCA of Cass & Clay Counties.

Sequencing Courses for the Major

Courses in the SM major are laid out to ensure students are heavily involved with sport-related materials during their junior and senior years. Our students are also educated on the general aspects of the business world as they complete their Minor in Business Administration. After all, sport is a business.

HNES 190 is our introductory course that provides students with a detailed overview of the sport industry and provides students an opportunity to better understand what is expected of professionals in sport and recreation management. HNES 192 is a practicum class that gives students preliminary experience working in the sport industry. Future classes provide students a more detailed view of the many imperative elements that are part of the successful sport managers' toolkit. The degree is capped with the student obtaining 516 hours of on-the-job internship experience working alongside experts and influencers within the sport industry.

ACCELERATED graduate PROGRAM

Students interested in continuing their education in sport management beyond their bachelor's degree have the option to begin their graduate studies in sport management in their senior year. With successful admission into the graduate program (and advisor approval), undergraduates can complete up to 9 credits of graduate-level coursework during their senior year that will be applied to their completion of a Master of Science in Sport Management (MSM). Details for the accelerated program can be found on the MSM catalog page.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110		3	COMM 110	3
HNES 190[1]		3	ACCT 102	3
ECON 105 (Busn Minor)		3	ENGL 120	3
Gen Ed Wellness		2	HNES 192	1
Gen Ed Quantitative Reasoning		3	Gen Ed Humanities/Fine Arts	3
			Gen Ed Science & Technology	3
		14		**16**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
MGMT 320 (Busn Minor)		3	HNES 226	3
MRKT 320 (Busn Minor)		3	Gen Ed Humanities/Fine Arts & Cult Div	3
COMM 112		3	Gen Ed Science & Tech w/ Lab	4
HNES 303		3	Free Elective	3
Gen Ed Science & Technology		3	Free Elective	2
		15		**15**
Junior				
Fall	**Credits**		**Spring**	**Credits**
ENGL 320 (Gen Ed Communication)		3	HNES 436	3
HNES 304		3	HNES 431	3
HNES 323		3	HNES 485[2]	3
HNES 485[2]		3	Business Minor	3
Business Minor		3	Business Competency or Elective	3
		15		**15**
Senior				
Fall	**Credits**		**Spring**	**Credits**
HNES 425		3	HNES 414	3
HNES 426		3	HNES 444	3
HNES 485[2]		3	HNES 485[2]	3
Business Competency or Elective		3	Business Competency or Elective	3
Business Competency or Elective		3	Business Competency or Elective	3
		15		**15**

Total Credits: 120

1

Require a grade of B or better

2

HNES 485 Internship can be taken for variable credit (depending on hours) throughout various terms, including summer, to reach a total 12 credits.

Degree Note and Requirements:

- An NDSU cumulative GPA of 2.75 or higher must be maintained and the student must earn a grade of C or better in the HNES major requirement courses (other than HNES 190).
- Obtain a B or higher in HNES 190 as indicated in the footnote.
- Have a 2.75 GPA or higher.
- Earn a 2.5 GPA within ACCT 102 and ECON 105 without receiving a grade of D in either course.

Sport Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/hnes/undergraduate_programs/sport_management/ (http://www.ndsu.edu/hnes/undergraduate_programs/sport_management/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/sport-management/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/sport-management/#planofstudytext)

Major Requirements

Major: Sport Management

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**
Category A: Humanities and Fine Arts †		**6**
Category B: Social and Behavioral Sciences †		**6**

Category W: Wellness †	**2**
Category D: Cultural Diversity *†	
Category G: Global Perspectives *†	
Total Credits	**39**

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Sport Management Core Requirements		
COMM 112	Understanding Media and Social Change	3
HNES 190	Introduction to Sport Management [1]	3
HNES 192	Sport Management Practicum	1
HNES 226	Socio-Cultural Dimension in Sport [2]	3
HNES 303	Sport Communication and New Media [2]	3
HNES 304	Sport Promotion and Public Relations [2]	3
HNES 323	Ethics of Sport [2]	3
HNES 414	Global Perspectives in Sport (HNES 614 for the accelerated program) [2]	3
HNES 425	Strategic Sport Marketing (HNES 625 for the accelerated program) [2]	3
HNES 426	Foundations of Sport Management (HNES 626 for the accelerated program) [2]	3
HNES 431	Sport Law [2]	3
HNES 436	Sport Facility and Event Management [2]	3
HNES 444	Sport Finance (HNES 644 for the accelerated program) [2]	3
HNES 485	Sport Management Internship (Students need to complete HNES 190, 226 and 304 before enrollment in HNES 485) [2]	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
Total Credits		**73**

1

Requires a grade of 'B' or better.

2

Requires a grade of 'C' or higher.

Degree Requirements and Notes

- An NDSU cumulative GPA of 2.75 or higher must be maintained and the student must earn a grade of C or better in the HNES major requirement courses (other than HNES 190) to remain in the sport management program.
- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits (other than HNES 192).
- Students who have specific career goals in mind may elect to complete additional minor(s) by choosing focused electives. Examples of other minors that compliment Sport Management include: Accounting, Community Development, Hospitality & Tourism Management, Human Development and Family Science, Journalism, Public Relations & Advertising, and Management Communication.

In order to enroll in 300-400 level sport management courses (with the exception of HNES 303), students must:

- Complete at least 50 credits with a GPA of 2.75 or higher.
- Obtain a B or higher in HNES 190 as indicated in the footnote.
- Complete one credit in HNES 192.
- Earn a 2.5 GPA within ACCT 102 and ECON 105 without receiving a grade of D in either course.
- Maintain active participation in Sport Management Association.

Statistics

Department Information

- **Department Web Site:**
  www.ndsu.edu/statistics/ (http://www.ndsu.edu/statistics/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/statistics/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/statistics/)

Today, most professional statistical training is received at the undergraduate, as well as at the graduate level. A major in statistics and a minor in any of the other related areas, such as mathematics, computer science, agriculture, biological sciences or social sciences provide a good blend of training suitable for many jobs in industry, government and academic institutions. It is becoming increasingly important for those in other disciplines to have good familiarity with basic statistical techniques and inference procedures.

The Program

The Department of Statistics offers a major leading to bachelor's, master's and doctoral degrees. Two undergraduate minors are offered, one in applied statistics and the second in statistics. Graduate certificates in Statistics and Big Data Applied Statistical Analysis are also available. A mathematics and statistics double major, the pre-actuarial science option and a degree in behavioral statistics are offered at the undergraduate level.

The department provides opportunities to study both applied and theoretical aspects of statistics. Computers are extensively used in statistics instruction, and statistical software packages and programs are utilized in various courses. Data analysis is an important aspect in applied statistics courses.

Career Opportunities

There are excellent opportunities in statistics. Major corporations and most government agencies continually look for talented individuals with this type of education. Since even greater job opportunities are open to those with advanced statistical training, many undergraduates proceed directly to graduate work in statistics. Many students combine statistics with areas such as business, education, economics or biology.

Career opportunities are varied. A statistician may:

- consult in the design and analysis of clinical studies, evaluating new pharmaceutical agents;
- design experiments for agricultural, ecological, environmental or energy-related studies;
- determine mortality, morbidity and accident rates for an insurance company;
- serve as an opinion pollster for a public relations firm or a television network;
- develop theories of learning and behavior in conjunction with psychologists;
- determine optimal combinations and evaluate performance of various chemicals in industrial setups;
- conduct reliability and quality control studies in various industries; or
- develop econometrics, time series and forecasting models for determining the cause and effects of various socio-economic variables on society.

Statisticians work closely with other scientists and researchers to develop new statistical techniques, adapt existing techniques, design experiments and direct analyses of surveys and retrospective studies.

Statisticians are ranked number one in best STEM jobs in 2022 according to U.S. News and World Report.

The Facilities

The campus has several computer clusters connected to the campus network and the Internet. SAS, SPSS, JMP, and R are among the statistical packages available. Computer consultants are available to assist students if programming help is needed.

Statistics Curriculum

For a statistics major, 15 to 18 credits in mathematics, four to seven credits in computer science and 21 to 27 credits in statistics are required. A minor in one of the following areas is also required: social science, physical science, biological sciences, business, mathematics or computer science.

Students interested in biostatistics may minor in biological sciences.

A student interested in business statistics may minor in business administration.

Pre-Actuarial Option

A joint degree with mathematics with a pre-actuarial science option is also available.

Behavioral Statistics Requirements

The behavioral statistics degree is a joint effort between the Department of Statistics and the Department of Psychology. Students wishing to obtain a degree in behavioral statistics should consult with an advisor in both departments. Employment opportunities include working with medical or Medicare data. Graduates of this program are expected to have good quantitative reasoning skills and strong people skills.

The Faculty

Rhonda C. Magel, Ph.D., Professor, Chair, University of Missouri, 1982; Field: Nonparametrics, Inference Under Order Restrictions, Regression

Megan Orr, Ph.D., Associate Professor, Iowa State University, 2012; Field: Gene Expression Analysis, High-Dimensional Data Analysis, Multiple Testing

Gang Shen, Ph.D., Associate Professor, Purdue University, 2009; Field: Mathematical Statistics, Asymptotic Theory, Bayesian Analysis, Change-Point Problem

Ronald Degges, Ph.D., Associate Professor of Practice, North Dakota State University, 2011; Field: Survival Analysis, Nonparametrics and Regression

Bong-Jin Choi, Ph.D., Assistant Professor, University of South Florida, 2014; Field: Computational Statistics, Machine Learning, Biostatistics, Public Health Research, Big Data Analysis

Mingao Yuan, Ph.D., Assistant Professor, Purdue University, 2018; Field: Network Analysis, Big Data Analysis, Statistical Machine Learning

Andrew Lexvold, M.S., Lecturer, North Dakota State University, 2016; Field: Biostatistics, Bayesian and Spatial Analyses Applied to Election Forecasting

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
ENGL 110		3	ENGL 120	3
COMM 110		3	MATH 129	3
MATH 165		4	MATH 166	4
STAT 330		3	CSCI 114	3
Gen Ed Wellness		2	Gen Ed Soc & Beh Sci/Glob Persp	3
		15		**16**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
STAT 367		3	STAT 368	3
STAT 461		3	CSCI 160	4
MATH 265		4	Minor Requirement	3
Gen Ed Hum & FA/Cult Div		3	Gen Ed Humanities & Fine Arts	3
Gen Ed Science and Tech w/Lab		4	Gen Ed Science and Technology	3
		17		**16**
Junior				
Fall	**Credits**		**Spring**	**Credits**
CSCI 222 or MATH 270		3	STAT Elective	3
Statistics Elective		6	Minor Requirement	3
Minor Requirement		3	Gen Ed Upper Division Writing	3
Gen Ed Social and Behavioral Sciences		3	Gen Ed Science & Technology	3
		15		**12**

Senior				
Fall	**Credits**		**Spring**	**Credits**
STAT Elective		3	STAT 462	3
Minor Requirement		3	STAT Elective	3
Electives		9	Minor Requirement	4
			Electives	4
		15		**14**

Total Credits: 120

Statistics

Department Information

- **Department Web Site:**
  www.ndsu.edu/statistics (http://www.ndsu.edu/statistics/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/statistics/ (http://catalog.ndsu.edu/programs-study/undergraduate/statistics/)

Major Requirements

Major: Statistics

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

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ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**
Category A: Humanities and Fine Arts †		**6**
Category B: Social and Behavioral Sciences †		**6**
Category W: Wellness †		**2**
Category D: Cultural Diversity *†		

Category G: Global Perspectives [*†]	
Total Credits	**39**

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

A grade of 'C' or better is required in ALL courses used toward the major.

Code	Title	Credits
Statistics Major Requirements		
CSCI 160	Computer Science I	4
CSCI 222	Discrete Mathematics	3
or MATH 270	Introduction to Abstract Mathematics	
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
STAT 367	Probability	3
STAT 368	Statistics	3
STAT 461	Applied Regression Models	3
STAT 462	Introduction to Experimental Design (Capstone)	3
Electives: Select 15 credits from the following (can choose only one CSCI course):		**15**
CSCI 161	Computer Science II	
CSCI 438	Simulation Models	
MATH 329	Intermediate Linear Algebra	
STAT 460	Applied Survey Sampling	
STAT 463	Nonparametric Statistics	
STAT 464	Discrete Data Analysis	
STAT 467	Probability and Mathematical Statistics I	
STAT 468	Probability and Mathematical Statistics II	
STAT 469	Introduction to Biostatistics	
STAT 470	Statistical SAS Programming	
STAT 471	Introduction to the R Language	
STAT 472	Time Series	
Minor Requirement		**16**
A minor is required in one of the following disciplines: Social Science, Physical Science, Biological Science, Business, Mathematics, or Computer Science.		
Total Credits		**65**

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Minor Requirements

Minor: Statistics

Minimum Credits: 17 or 22

Standard Track

Code	Title	Credits
Required Courses		
MATH 165	Calculus I	4
MATH 166	Calculus II	4
STAT 331	Regression Analysis	2
or STAT 461	Applied Regression Models	
STAT 367	Probability	3
STAT 368	Statistics	3
STAT 462	Introduction to Experimental Design	3
STAT Elective	400 Level	3
Total Credits		**22**

Applied Statistics Track

Code	Title	Credits
Required Courses		
STAT 330	Introductory Statistics	3
STAT 331	Regression Analysis	2
STAT Electives	Select 4 department approved 400-level, 3 credit statistics courses.	12
Total Credits		**17**

Minor Requirements and Notes

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

Strategic Communication

Department Information

- **Department Web Site:**
  www.ndsu.edu/communication/ (http://www.ndsu.edu/communication/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/strategic-communication/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/strategic-communication/)

Strategic Communication is one of four majors offered by the Department of Communication. Students may choose from professional emphases in advertising or public relations.

Why Choose a Major in the Department of Communication?

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

As a Strategic Communication major, you will get:

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

Strategic Communication Major

A public relations emphasis will orient students to the principles and practices of public relations, an advertising emphasis to the principles and practices of advertising. Students will complete an applied capstone course in their final semester. Students majoring in strategic communication may earn a Bachelor of Arts degree (with intermediate-level language proficiency) or a Bachelor of Science degree (with recommended minor or certificate).

ADMISSION TO THE MAJOR

Students are admitted to the strategic communication major after completing 18 credits of pre-communication courses: COMM 110, COMM 112, COMM 114, COMM 212, COMM 220, and ENGL 120.

Internship Requirement

Internships offer practical experience for strategic communication students. Three credits (120 hours) of field experience are required for the major, and many students complete more than one internship. Students have interned with advertising/marketing firms, non-profits, and media companies in the Fargo-Moorhead area and beyond. Internships often lead to jobs.

Career Opportunities

Coursework in the strategic communication major prepares students for careers that include graphic design, copy writing/editing, client services, event planning, promotion, evaluation, publicity and media relations, creative design, professional business consulting, and corporate training. The courses in each emphasis area promote written and oral communication skills and prepare students to communicate in meaningful and effective ways with a variety of audiences.

Extra-Curricular Activities

Students majoring in strategic communication are encouraged to gain experience by joining the Advertising Club or the department's chapter of the Public Relations Student Society of America (PRSSA). NDSU has two honoraries for top students majoring in a degree program offered by the Department of Communication. Pi Kappa Delta is a national honor fraternity for students involved in human communication activities. Lambda Pi Eta is a national honorary for communication majors with high academic achievement.

High School Preparation

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

Scholarships

The Department of Communication awards a number of scholarships to students who excel in academics and who have demonstrated career potential. Applications are due by March 1. Visit **the department website** for details.

The Faculty

Faculty members in the Department of Communication are dedicated teachers, scholars, and practitioners who are committed to providing high-quality courses, hands-on learning experiences, and opportunities for undergraduate research.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 101	1	COMM 110	3
COMM 112	3	COMM 200	3
COMM 114	3	ENGL 120	3
ENGL 110 (or placement)	3	Gen Ed Hum & FA/Cult Div	3
Gen Ed Quantitative Reasoning	3	Gen Ed Science & Technology	3
Gen Ed Wellness	2	Gen Ed Science & Technology w/Lab	1
	15		**16**

Second Year				
Fall	**Credits**		**Spring**	**Credits**
COMM 212		3	COMM 375	3
COMM 220		3	Major Elective	3
Gen Ed Science & Technology		3	Gen Ed Humanities/Arts	3
Free Electives		6	Gen Ed Science & Technology	3
			Free Elective	3
		15		**15**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
COMM 377		3	COMM 425	3
Major Elective		3	COMM 496	3
Gen Ed Upper Division Writing		3	Major Elective	3
Free Electives		6	Free Electives	6
		15		**15**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
COMM 431		3	COMM 472, 473, or 476	3
COMM 470		3	Major Elective	3
Major Elective		3	Free Electives	8
Major Elective		3		
Free Elective		3		
		15		**14**

Total Credits: 120

Strategic Communication

Department Information

- **Department Web Site:**
  www.ndsu.edu/communication/ (http://www.ndsu.edu/communication/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/strategic-communication/ (http://catalog.ndsu.edu/programs-study/undergraduate/strategic-communication/)

Major Requirements

Major: Strategic Communication

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.

7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Pre-Communication Requirements:		
Students must complete the following 18 credits of coursework to be admitted to the major.		
ENGL 120	College Composition II	3
COMM 110	Fundamentals of Public Speaking	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3
COMM 220	Persuasion	3
Strategic Communication Major Requirements		
COMM 101	Majors and Careers in Communication	1
COMM 200	Introduction to Media Writing	3
COMM 375	Principles of Strategic Communication	3
COMM 377	Media Planning	3
COMM 425	Specialty Writing	3
COMM 431	Communication Ethics and Law	3
COMM 470	Research for Strategic Communication	3
COMM 472	Public Relations Campaigns	3
or COMM 473	Case Study in Public Relations	
or COMM 476	Advertising Campaign Practicum	
COMM 496	Field Experience	3
Select one from the following for upper division writing requirement:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	

ENGL 322	Writing and the Creative Process	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 326	Writing in the Design Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Electives		
Six COMM courses selected in consultation with one's advisor. Students can specialize in Advertising or Public Relations. Up to 3 additional credits of COMM 496 can be counted toward this requirement.		18
Total Credits		**64**

Minor Requirements

Minor: Strategic Communication

Required Credits: 21

Code	Title	Credits
COMM 112	Understanding Media and Social Change	3
COMM 200	Introduction to Media Writing	3
COMM 375	Principles of Strategic Communication	3
Professional Specialization Electives:		**12**
COMM 308	Business and Professional Speaking	
COMM 330	Photography for the Media	
COMM 362	Principles of Design For Media	
COMM 376	Advertising Creative Strategies	
COMM 377	Media Planning	
COMM 425	Specialty Writing	
COMM 435	Critical Approaches to Popular Culture	
COMM 442	Digital Media and Society	
COMM 465	Convergence Media	
COMM 472	Public Relations Campaigns	
COMM 476	Advertising Campaign Practicum	
COMM 485	Risk and Crisis Communication	
Total Credits		**21**

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.

Supply Chain Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/supply-chain-management/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/supply-chain-management/)

As a supply chain management major, you will learn the fundamental concepts and tools to make informed and responsible decisions about purchasing, inventory control, warehousing and distribution, and the dynamic system that supply chain represents. Supply chain students know how to model different components of the supply chain system and learn how to use supply chain technology to enhance the system. They come to understand and manage the hub of the system by learning about the production and operation processes. The Supply Chain Management major is the

only Science, Technology, Engineering, and Mathematics (STEM) designed major in the College of Business. We successfully place our graduates in organizations where their supply chain management expertise is valued and rewarded.

Background Information

AACSB International, The Association to Advance Collegiate Schools of Business, accredits the undergraduate and graduate programs in the College of Business at North Dakota State University. The College of Business is one of only two accredited schools of business in North Dakota.

AACSB International is one of higher education's most prestigious and rigorous accrediting bodies, stressing academic excellence and a commitment to continuous improvement. Less than 10 percent of business programs worldwide have this accreditation.

The Program

Business students take core courses that cover all of the functional areas of a business, from marketing to management and accounting. Supply chain management courses build on this foundation to help students understand the way supply chain impacts the global economy. Courses cover integrate supply chain management, managing inventory and materials, supplier and customer relations, international supply chain management, scheduling in supply chain management, and more. The major provides you with an electronic portfolio to document your work which can be used during the job search process. Your assignments might be the use of a simulation to model a specific supply chain or a problem-based experience with a real supply chain organization. In addition to a thorough knowledge of the supply chain, you'll learn problem-solving competencies, teamwork, effective written and oral communication competencies, how to manage your career, and both management and leadership competencies.

HANDS-ON EXPERIENCE

Supply chain management students can join the Supply Chain Student Organization. This student organization brings in industry speakers and also provides students with an opportunity to network. In addition, there are numerous opportunities to find internships in the supply chain management field and to attend field trips to supply chain organizations.

Selective Admission

Students who wish to study supply chain management at NDSU enroll as pre-supply chain amangement majors in the College of Business for the first semester of their freshman year. Pre-supply chain management majors then apply for admission to the major after completing the pre-major courses required for admission, including ENGL 120, COMM 110, MATH 144, ECON 201 or 202, and PSYC 111 or SOC 110. Transfer students with appropriate course work may also apply.

Admission to the major is based upon the successful completion of the pre-major course requirements and a minimum cumulative grade point average (GPA) of 2.50.

The Minor

Working in conjunction, the College of Business (https://www.ndsu.edu/business/), the Department of Industrial and Manufacturing Engineering (https://www.ndsu.edu/ime/), and the Department of Agribusiness and Applied Economics (http://www.ag.ndsu.edu/agecon/) offer a minor in Supply Chain Management. Companies directly involved with distribution, manufacturing, 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. A median salary in the field of logistics management is $77,000.

The Faculty

In order to provide a rigorous and timely educational experience, we have recruited and attracted faculty who are highly qualified to teach supply chain management. Dedicated to student learning, our faculty have often been recognized for their teaching excellence by students and colleagues. The faculty employ a wide variety of instructional techniques and are considered especially strong in approaches to the study of supply chain system dynamics and management decision making. They remain current in their sub-fields of supply chain management by actively engaging in research and constantly assisting organizations in identifying and solving supply chain challenges.

The INTERNSHIP

Supply chain management majors are encouraged to complete a three-credit internship. The internship is designed to enable students to relate supply chain concepts learned in the classroom to actual business situations and to give them a competitive edge in job placement.

Career Opportunities

Graduates with a supply chain management major have opportunities in business, industry, government service, and the non-profit sector, both regionally and globally. Job opportunities for supply chain management majors are found in manufacturing, in retail organizations, humanitarian organizations, in transportation firms, and large retail store distributions centers. There are thousands of job openings for supply chain management graduates throughout the country. Starting salaries range from $68,000 to $110,000.

The College

The College of Business also offers majors in accounting, business administration, management, marketing, management information systems, and global business (second major only), as well as Master of Business Administration, Master of Supply Chain Management, Master in Business Analytics, Master of Accountancy, and a PhD in Transportation and Supply Chain degrees.

High School Preparation

It is recommended that high school students interested in studying supply chain management at the university level take mathematics courses at least through pre-calculus. High school electives in the social sciences, English and communication also would be of benefit. Please speak with a professional advisor for more information.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	3	ENGL 120	3
TL 116	3	MATH 144	4
COMM 110	3	PSYC 111 or SOC 110	3
PHIL 216	3	Gen Ed Hum & Fine Arts/Cult Div	3
Gen Ed Wellness	2	Free Elective	3
	14		**16**
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ACCT 200	3	ACCT 201	3
ECON 201	3	ECON 202	3
STAT 330	3	STAT 331	2
Gen Ed Science & Tech	3	Gen Ed Science & Tech/Lab	4
Free Elective	3	Free Elective	3
	15		**15**
Junior			
Fall	**Credits**	**Spring**	**Credits**
ENGL 320	3	BUSN 430	3
SCM 320	3	FIN 320	3
MGMT 320	3	SCM 330	3
MIS 320	3	SCM 425	3
Free Elective	3	SCM 450	3
	15		**15**
Senior			
Fall	**Credits**	**Spring**	**Credits**
MRKT 320	3	BUSN 489	3
SCM 325	3	SCM 435	3
300-400 level Supply Chain Elective	3	SCM 460	3

Free Electives	6	300-400 level Supply Chain Elective	6
	15		**15**

Total Credits: 120

Supply Chain Management

Department Information

- **Department Web Site:**
  www.ndsu.edu/business/ (http://www.ndsu.edu/business/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/programs-study/undergraduate/supply-chain-management/ (http://catalog.ndsu.edu/programs-study/undergraduate/supply-chain-management/)

Degree Requirements

Major: Supply Chain Management

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Supply Chain Management Requirements

Code	Title	Credits
Pre-Major Requirements		
COMM 110	Fundamentals of Public Speaking [2]	3
ENGL 120	College Composition II [2]	3
MATH 144	Mathematics for Business [2]	4
PSYC 111	Introduction to Psychology [2]	3
or SOC 110	Introduction to Sociology	
ECON 201	Principles of Microeconomics [2]	3
or ECON 202	Principles of Macroeconomics	
Supply Chain Major Requirements		
TL 116	Business Software Applications [2]	3
ACCT 200	Elements of Accounting I [2]	3
ACCT 201	Elements of Accounting II [2]	3
ECON 202	Principles of Macroeconomics (Select the course not taken for the pre-major.) [2]	3
or ECON 201	Principles of Microeconomics	
PHIL 216	Business Ethics [2]	3
ENGL 320	Business and Professional Writing [2]	3
STAT 330	Introductory Statistics [2]	3
STAT 331	Regression Analysis [2]	2
SCM 320	Integrated Supply Chain Management [2]	3
FIN 320	Principles of Finance [1, 2]	3
MGMT 320	Foundations of Management [1, 2]	3
MIS 320	Management Information Systems [1, 2]	3
MRKT 320	Foundations of Marketing [1, 2]	3
BUSN 430	Legal and Social Environment of Business [1, 2]	3
BUSN 489	Strategic Management [1, 2]	3
SCM 325	Managing Inventory and Materials [2]	3
SCM 330	Supply Chain Analysis and Analytics [2]	3
SCM 425	Procurement & Sourcing [2]	3
SCM 435	Transportation & Distribution [2]	3
SCM 450	Supplier & Customer Relations [2]	3
SCM 460	Production & Operations Management [2]	3
Select three courses from the SCM electives below:		9
SCM 453	Financing the Supply Chain [2]	
SCM 455	Supply Chain Technology Enablers [2]	
SCM 457	Scheduling in Supply Chain Management [2]	
SCM 462	Modeling the Supply Chain [2]	
SCM 465	International Supply Chain Management [2]	
Total Credits		**87**

1

Denotes Common Body of Knowledge (CBK) courses.

2

Course requires a grade of C or higher.

Degree Requirements and Notes:

- Students follow the published curricula for the supply chain 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.
- Admission into the supply chain management major is required to enroll in the advanced 300 or 400 level supply chain courses in the CoB.
- A letter grade must be earned in any course that fulfills a major requirement (with the exception of some practicum options).
- Students must be accepted to the supply chain 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.

Minor Requirements

Minor: Logistics Management

Required Credits: 18

MINOR REQUIREMENTS

A grade of 'C' or better is required in all courses used to satisfy the minor.

Code	Title	Credits
Core Course		
SCM 320	Integrated Supply Chain Management	3
Select 15 credit from the following:		15
AGEC 339	Quantitative Methods & Decision Making	
AGEC 378	Introduction to Transportation & Logistics	
AGEC 472	Advanced Logistical Analysis	
IME 456	Program and Project Management	
IME 470	Operations Research I	
IME 480	Production and Inventory Control	
SCM 330	Supply Chain Analysis and Analytics	
SCM 425	Procurement & Sourcing	
SCM 435	Transportation & Distribution	
SCM 450	Supplier & Customer Relations	
SCM 453	Financing the Supply Chain	
SCM 455	Supply Chain Technology Enablers	
SCM 462	Modeling the Supply Chain	
SCM 465	International Supply Chain Management	
Total Credits		**18**

Minor Requirements and Notes

- To enroll in 300/400 level college of business courses, students must have 2.5 minimum institutional cumulative GPA.
- To complete this minor, students must earn at minimum 2.50 GPA in courses used to satisfy the minor requirements. Courses may not be taken pass/fail. Minors must satisfy all course prerequisites.
- Students majoring in Supply Chain Management are not eligible for this minor.
- A minimum of 8 credits must be taken at NDSU.

Theatre Arts

Department Information

- **Department Web Site:**
  www.ndsu.edu/performingarts/theatre/ (http://www.ndsu.edu/performingarts/theatre/)
- **Credential Offered:**
  B.A.; B.S.; B.F.A.; Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/theatre-arts/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/theatre-arts/)

The Department of Theatre Arts is dedicated to the highest standards of excellence in both its academic and performance/technical theatre programs. Its energies are committed to fostering student creativity in all areas of theatre—design, performance, directing and management—and to help students gain better insights into themselves and the world around them. The theatre arts program has been a vital and important part of the

curriculum and student activities at North Dakota State University for more than 100 years. The program is accredited by the National Association of Schools of Theatre.

The Curriculum

The department offers three undergraduate degree programs in theatre. Each is flexible and can be designed to fit the individual student's career goals.

The Bachelor of Arts (B.A.) in theatre arts is a general baccalaureate degree built around a traditional liberal arts curriculum. Courses are required in technical theatre, performing and directing, as well as in literature, theatre history and modern language. The B.A. program requires proficiency of a foreign language at the second year level.

The Bachelor of Science (B.S.) degree is an alternative to the B.A. The B.S. requires a minor in an approved field.

The Bachelor of Fine Arts (B.F.A.) with an emphasis in musical theatre, performance or design technology is a professionally-oriented degree track that places primary emphasis on performance and studio activity, while also requiring a high level of involvement in the academic curriculum. It can be entered only by audition. This degree track broadens the student's exposure to his or her field, and considerable study is made of other fine arts fields as well.

Admission to the B.F.A. degree program in theatre requires consistent involvement in Theatre NDSU and LCT Productions, and demands a high level of commitment on the part of the student.

The Program

Theatre NDSU is a laboratory for learning in which imaginative play and disciplined work are fused in dramatic creations. A high degree of professionalism is consistently displayed.

(1) *Main Stage Productions*—four plays are produced each school year. These productions range from modern musicals such as *Bloody, Bloody Andrew Jackson* and *Sweeney Todd* to classic comedies such as *The Comedy of Errors* and *Noises Off*, including contemporary and ancient plays of the widest variety. Production seasons are chosen according to a four year style-rotation cycle. This ensures that during the course of his or her undergraduate career, the student will have the opportunity to acquire first-hand knowledge of all major performance styles in the Western theatrical tradition, including Devised work and TYA or Theatre for Young Audiences.

(2) *The Newfangled Theatre Company* is the student branch of Theatre NDSU. This student-managed company produces up to four shows in the second stage season.

Numerous dramatic activities take place on a flexible schedule in Studio Theatre Productions. There are showcase productions for B.F.A. candidates and for student acting or directing projects as well as a dance recital each semester.

The Facilities

Theatre arts students study, work and create on three stages:

(1) Askanase Auditorium (the main stage), a 380-seat theatre with continental seating,

(2) the Studio Theatre, a flexible studio-lab black box space also located in Askanase Hall, and

(3) the 1,000-seat Festival Concert Hall, in Reineke Fine Arts Center, used for major musical stage productions.

In addition, Askanase Hall contains theatre classrooms, costume, scene and property shops.

Career Opportunities

Theatre training develops and exercises the creative imagination. Our graduates have found a rich variety of professions. Former students have gone on to earn advanced degrees in theatre and related fields and now teach in colleges and universities, community colleges and high schools. Other graduates of our program work in arts management, technical theatre and technical consulting, as well as in community theatre, semi-professional repertory companies, professional theatre and commercial radio and television. Theatre NDSU is committed to helping students understand the value of entrepreneurship in the Arts, creating their own work and community outreach.

Scholarships

A number of scholarships in theatre arts are available for students both in performance and technical emphases. Several scholarships are available to incoming freshmen. Both a student's academic record and his or her level of achievement in the production program are criteria used in awarding these scholarships. Active participation in the NDSU theatre arts program is expected of all scholarship recipients. Applications can be found on the Department of Theatre Arts website (https://www.ndsu.edu/performingarts/theatre/scholarships/).

Sample Program Guide

B.F.A. Design & Tech

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

Freshman				
Fall	**Credits**		**Spring**	**Credits**
THEA 110		3	THEA 180	3
THEA 210 or 211		1	THEA 210 or 211	1
THEA 230		3	THEA 270 & THEA 220	4
THEA 272		3	THEA 373	3
ENGL 110		3	ENGL 120	3
		13		**14**
Sophomore				
Fall	**Credits**		**Spring**	**Credits**
THEA 161		3	THEA 210 or 211	1
THEA 210 or 211		1	THEA 280 or 115	3
THEA 375		3	THEA 370	3
THEA 275		3	THEA 376	3
THEA 271 & THEA 221		4	THEA 279	3
			Gen Ed Science & Technology w/lab	4
		14		**17**
Junior				
Fall	**Credits**		**Spring**	**Credits**
THEA 210 or 211		1	THEA 210 or 211	1
THEA 370		3	THEA 377	3
THEA 371		3	ENGL 380	3
COMM 110		3	THEA 385	3
Gen Ed Social & Behavioral Science		3	Gen Ed Upper Division Writing	3
Gen Ed Science & Technology		3	Free Elective	3
		16		**16**
Senior				
Fall	**Credits**		**Spring**	**Credits**
THEA 365		3	THEA 210 or 211	2
THEA 450		3	ART 111	3
THEA 480		3	Gen Ed Soc & Beh Sci/Cult Div	3
MUSC 100 or 103		3	Gen Ed Wellness	2
Gen Ed Science & Technology		3	Gen Ed Quantitative Reasoning	3
			Free Elective	2
		15		**15**

Total Credits: 120

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

B.F.A. Musical Theatre

Freshman					
Fall	**Credits**		**Spring**	**Credits**	
THEA 110		3	THEA 180		3
THEA 161		3	THEA 210 or 211		1
MUSC 167		1	THEA 266		3
MUSC 130		3	THEA 263		1
MUSC 132		1	THEA 270 or 271		3
ENGL 110		3	THEA 220 or 221		1
			ENGL 120		3
			MUSC 160		1
			MUSC 167		1
		14			**17**
Sophomore					
Fall	**Credits**		**Spring**	**Credits**	
THEA 210		1	THEA 210, 223, or 224		2
THEA 362		2	THEA Design Elective taken fall or spring[take fall or spring THEA 371 / 373 / 375]		
THEA 364		3	THEA 228 or 368		3
THEA 270 or 271		3	THEA 263		1
THEA 220 or 221		1	THEA 280 or 115		3
MUSC 267		1	COMM 110		3
THEA Design Elective taken fall or spring[take fall or spring THEA 371 / 373 / 375]		3	MUSC 267		1
THEA 367 (Or Gen Ed)		3	Social & Behavioral Science Gen ED		3
		17			**16**
Junior					
Fall	**Credits**		**Spring**	**Credits**	
THEA 210		1	THEA 210 or 211		1
THEA 362		2	THEA 228 or 368		3
THEA 365		3	THEA 466 or 368		3
THEA 467 or 462 (course offered every other fall)		3	MUSC 367		1
MUSC 367		1	THEA 263		1
THEA 367 or 463		3	Science & Technology Gen Ed wlab		4
Science Tech Gen Ed		3	Wellness Gen Ed		2
		16			**15**

Senior				
Fall	**Credits**		**Spring**	**Credits**
THEA 450		3	THEA 210 or 211	1
THEA 467 if not taken Junior year			THEA 466 or 368	3
THEA 480		3	THEA 367	3
MUSC 100 or 111		3	Social & Behavioral Science/Global Perspectives Gen Ed	3
MUSC 467 or THEA 462		1-3	Science & Technology Gen Ed	3
THEA 275 (or science gen ed)		3	Quantitative Reaoning Gen Ed	3
Upper Level Writing Gen Ed		3		
		16-18		**16**

Total Credits: 127-129

Sample Program Guide

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B.F.A. Performance

Freshman				
Fall	**Credits**		**Spring**	**Credits**
THEA 161		3	THEA 180	3
THEA 110		3	THEA 210 or 211	1
THEA 210		1	THEA 270 or 271	3
THEA 270 or 271		3	THEA 220 or 221	1
THEA 220 or 221		1	THEA 266	3
ENGL 110		3	THEA 262	1
			ENGL 120	3
			Social and Behavioral Science Gen Ed	3
		14		**18**

Sophomore				
Fall	**Credits**		**Spring**	**Credits**
THEA 210 or 211		1	THEA 210 or 211	1
THEA 275		3	THEA 280 or 115	3
THEA 364		3	THEA 361 or 466	3
MUSC 100 or 111		3	COMM 110	3
THEA Design Elective taken fall or spring take fall or spring THEA 371 / 373 / 375			THEA Design Elective taken fall or spring take fall or spring THEA 371 /373 / 375	3
Science & Technology w/Lab Gen Ed		4	Quantitative Reasoning Requirement	3
		14		**16**

Junior				
Fall	**Credits**		**Spring**	**Credits**
THEA 210 or 211		2	THEA 210 or 211	2

THEA 365	3	Performance Elective: 160/228/345	3
Performance Elective: 160/228/345	3	THEA 361 or 466	3
THEA 462 or 467	3	THEA 263	1
MUSC 162 or 167	1	THEA 461 or 368	3
Social & Behavioral Science Gen Ed	3	ENGL 380	3
	15		**15**

Senior			
Fall	**Credits**	**Spring**	**Credits**
THEA 450	3	THEA 210 or 211	1
THEA 480	3	THEA 263	1
THEA 462 or 467	3	THEA 461 or 368	3
Upper level Writing	3	ART 111	3
Science & Technology Gen Ed	3	Science & Technology Gen Ed	3
		Wellness Gen Ed	2
		Free Elective	3
	15		**16**

Total Credits: 123

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

B.A./B.S.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
THEA 110	3	THEA 271 & THEA 221	4
THEA 161	3	ENGL 120	3
THEA 180	3	COMM 110	3
THEA 270 & THEA 220	4	THEA 210 or 211	1
ENGL 110	3	Gen Ed Quantitative Reasoning	3
THEA 210 or 211	1		
	17		**14**

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
THEA 210 or 211	1	THEA 210 or 211	1
THEA 371, 373, or 375	3	Theatre Option Elective[1]	3
Theatre Option Elective[1]	3	Theatre Option Elective[1]	3
Theatre Option Elective[1]	3	Minor or Language [2]	3
College Requirement Area One	3	Gen Ed Science & Technology	3
Minor or Language[2]	3	Gen Ed Wellness	2
	16		**15**

Junior				
Fall	**Credits**		**Spring**	**Credits**
THEA 210 or 211		1	THEA 210 or 211	1
THEA 365		3	THEA 280	3
College Requirement Area Two		3	Theatre Option Elective[1]	3
Gen Ed Social & Behavioral Science		3	Theatre Option Elective[1]	3
Gen Ed Science & Technology w/ Lab		4	Minor or Language[2]	3
			Gen Ed Science & Technology	3
		14		**16**
Senior				
Fall	**Credits**		**Spring**	**Credits**
THEA 450		3	THEA 210 or 211	2
THEA 480		3	Gen Ed Social/Beh Sciences & Global Perspectives	3
Gen Ed Upper Level Writing		3	Minor or Free Elective	3
Minor or Language[2]		3	Minor or Free Elective	3
Free Elective		2	College Requirement Area Three	3
		14		**14**

Total Credits: 120

1

Theatre Option Electives can be chosen from the courses listed on the official curriculum. The Theatre Generalist option requires a minimum of 15 credits. The Design & Technology option requires a minimum of 18 credits.

2

B.S. degrees require a minimum credit total of 16 credits. B.A. degrees require the completion of a foreign language with secondary year proficiency (Ex. SPAN 101, 102, 201, and 202).

Theatre Arts

Department Information

- **Department Web Site:**
  www.ndsu.edu/performingarts/theatre/ (http://www.ndsu.edu/performingarts/theatre/)
- **Credential Offered:**
  B.A.; B.S.; B.F.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/theatre-arts/ (http://catalog.ndsu.edu/programs-study/undergraduate/theatre-arts/)

Major Requirements

Major: Theatre Arts

Degree Type: B.A. or B.S.
Minimum Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.

7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Core Requirements		
THEA 110	Introduction to Theatre Arts	3
THEA 161	Acting I	3
THEA 180	Dramatic Literature and Style I	3
THEA 270 & THEA 220	Stagecraft and Stagecraft Lab	4
THEA 271 & THEA 221	Costume Craft and Costume Craft Lab	4
THEA 280	World Theatre	3
or THEA 115	World Film	
THEA 365	Directing I	3
THEA 450	Capstone Experience	3
THEA 480	History and Literature of Theatre I	3
THEA 371	Introduction to Design: Scenic Design *	3
or THEA 373	Lighting and Sound Design for the Theatre	
or THEA 375	Costume Design for the Theatre	
Practicum - 8 credits from the following:		8
THEA 210	Theatre Practicum (May be repeated multiple times; 1-2 credits)	
THEA 211	Stage Management Practicum and Seminar (May be repeated multiple times; 2 credits)	
Option		
Select one for the two options listed below to complete this major: Theatre Generalist (15 credits) or Design & Technology (18 credits)		15-18

Option One: Theatre Generalist

Code	Title	Credits
Select 15 credits from the following courses. A minimum of 9 of the 15 credits must be 300 level or above:		15
THEA 115	World Film *	
or THEA 280	World Theatre	
THEA 160	Storytelling	
THEA 230	Introduction to Theatrical Rendering	
THEA 262	Introduction to Dance	
THEA 266	Voice and Movement for the Actor	
THEA 272	Drawing for the Theatre	
THEA 275	Theatrical Makeup Design	
THEA 279		
THEA 345	Devising	
THEA 361	Acting III: Advanced Realism	
THEA 362	Dance Styles for Theatre	
THEA 364	Advanced Acting	
THEA 367	Acting the Song	
THEA 370	Technical Theatre Production	
THEA 371	Introduction to Design: Scenic Design *	
or THEA 373	Lighting and Sound Design for the Theatre	
or THEA 375	Costume Design for the Theatre	
THEA 379	Global Seminar	
THEA 385	Period Style for Performance	
THEA 465	Directing II	
ENGL 380	Shakespeare	
Total Credits		**15**

Option Two: Design & Technology

Code	Title	Credits
Take a different course from what was taken in the Core Requirements above.		
THEA 371	Introduction to Design: Scenic Design *	3
or THEA 373	Lighting and Sound Design for the Theatre	
or THEA 375	Costume Design for the Theatre	
Select 15-18 credits from the following courses. A minimum of 9 of the 18 credits must be 300 level or above:		15
THEA 230	Introduction to Theatrical Rendering	
THEA 272	Drawing for the Theatre	
THEA 275	Theatrical Makeup Design	
THEA 279		
THEA 370	Technical Theatre Production (May be repeated twice; 3-6 credits)	
THEA 371	Introduction to Design: Scenic Design (can take the final course as an elective)	
or THEA 373	Lighting and Sound Design for the Theatre	
or THEA 375	Costume Design for the Theatre	
THEA 372		
THEA 385	Period Style for Performance	
THEA XXX	Internship (3-6 credits)	
ENGL 380	Shakespeare	
ART 122	Studio Technology Foundations	
ART 185	Graphic Design I	
ADHM 155	Apparel Construction and Fit	
ADHM 310	History of Fashion	
Total Credits		**18**

*
Student must take one of the courses in the major core requirements and will take a different course in the option.

Degree Requirements & Notes:

- Students must earn a grade of C or better in all THEA prefix courses.

Major Requirements

Major: Theatre Arts - Design & Tech Theatre Track

Degree Type: B.F.A.
Minimum Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Code	Title	Credits
Professional Major Requirements		
Students must earn a minimum grade of a 'C' in all THEA prefix courses.		
ART 111	Introduction to Art History (May satisfy general education category A and G)	3
MUSC 100	Music Appreciation (May satisfy general education category A)	3

or MUSC 103	Introduction to Music History	
THEA 110	Introduction to Theatre Arts	3
THEA 161	Acting I	3
THEA 230	Introduction to Theatrical Rendering	3
THEA 180	Dramatic Literature and Style I	3
THEA 270 & THEA 220	Stagecraft and Stagecraft Lab *	4
THEA 271 & THEA 221	Costume Craft and Costume Craft Lab *	4
THEA 272	Drawing for the Theatre *	3
THEA 275	Theatrical Makeup Design *	3
THEA 279	*	3
THEA 280	World Theatre (May satisfy a general education category D)	3
or THEA 115	World Film	
THEA 365	Directing I	3
THEA 370	Technical Theatre Production (Take 3 credits 2 times) *	6
THEA 371	Introduction to Design: Scenic Design	3
THEA 373	Lighting and Sound Design for the Theatre	3
THEA 375	Costume Design for the Theatre	3
THEA 376	Theatrical Design Studio I: Theatrical Drawing and Rendering *	3
THEA 377	Theatrical Design Studio II: Collaboration of the Designer *	3
THEA 385	Period Style for Performance	3
THEA 450	Capstone Experience	3
THEA 480	History and Literature of Theatre I	3
Practicum- 8 credits from the following:		8
THEA 210	Theatre Practicum (Repeatable, 1-2 credits) *	
THEA 211	Stage Management Practicum and Seminar (2 credits) *	
Related Area:		
ENGL 380	Shakespeare	3
Total Credits		**82**

*
Students must earn a minimum grade of a 'B' in these Design and Technology courses.

Major Requirements

Major: Theatre Arts - Musical Theatre Track

Degree Type: B.F.A.
Minimum Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Students must earn a minimum grade of a 'C' in all THEA or MUSC prefix courses.

Code	Title	Credits
Professional Major Requirements		
ART 111	Introduction to Art History	3
MUSC 100	Music Appreciation	3
or MUSC 103	Introduction to Music History	
MUSC 130	Theory and Analysis I	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 160	Piano Class I ((Possible to test out of this requirement))	1
MUSC 167	Applied Voice (2 credits in different semesters)	2
MUSC 267	Applied Voice (2 credits in different semesters)	2
MUSC 367	Applied Voice (2 credits in different semesters)	2
MUSC 467	Applied Voice	1
THEA 110	Introduction to Theatre Arts	3
THEA 161	Acting I [1]	3
THEA 180	Dramatic Literature and Style I	3
THEA 228	Development of Musical Theatre [1]	3
THEA 263	Dance Studio (take one each of Jazz, Lyrical Ballet, Tap) [1]	3
THEA 364	Advanced Acting	3
THEA 266	Voice and Movement for the Actor [1]	3
THEA 270 & THEA 220	Stagecraft and Stagecraft Lab (Taken with THEA 270 Stagecraft)	4
THEA 271 & THEA 221	Costume Craft and Costume Craft Lab (Taken with THEA 271 Costume Craft)	4
THEA 275	Theatrical Makeup Design	3
THEA 280	World Theatre	3
or THEA 115	World Film	
THEA 362	Dance Styles for Theatre (Take 2 times) [1]	4
THEA 365	Directing I	3
THEA 367	Acting the Song (Take 3 credits 2 times)	6
THEA 368	Business of Acting	3

THEA 450	Capstone Experience	3
THEA 462	Acting Styles	3
THEA 466	Advanced Voice for the Actor [1]	3
THEA 467	Advanced Movement for the Actor [1]	3
THEA 480	History and Literature of Theatre I	3
Select one from the following:		3
THEA 371	Introduction to Design: Scenic Design	
THEA 373	Lighting and Sound Design for the Theatre	
THEA 375	Costume Design for the Theatre	
Theatre Practice - 8 credits from the following:		8
THEA 210	Theatre Practicum (Repeatable 1-2 credits) [2]	
THEA 211	Stage Management Practicum and Seminar (Repeatable - 2 credits)	
Total Credits		**95**

1

Students must earn a minimum grade of 'B' in these music, dance and performance courses.

2

First year students taking THEA 220 or THEA 221 will not take Practicum 210. When students take THEA 222, 223 or 224 they will take Practicum 210 for 1 cr.

Major Requirements

Major: Theatre Arts - Performance Track

Degree Type: B.F.A.
Minimum Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**
Category A: Humanities and Fine Arts †		**6**
Category B: Social and Behavioral Sciences †		**6**
Category W: Wellness †		**2**
Category D: Cultural Diversity *†		

Category G: Global Perspectives [*†]	
Total Credits	**39**

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Major Requirements

Students must earn a minimum grade of a 'C' in all THEA prefix courses.

Code	Title	Credits
Professional Major Requirements		
ART 111	Introduction to Art History	3
ENGL 380	Shakespeare	3
MUSC 100	Music Appreciation	3
or MUSC 103	Introduction to Music History	
THEA 110	Introduction to Theatre Arts	3
THEA 161	Acting I [*]	3
MUSC 162	Voice Class	1
or MUSC 167	Applied Voice	
THEA 180	Dramatic Literature and Style I	3
THEA 262	Introduction to Dance [1]	1
THEA 263	Dance Studio (take 2 times) [1]	2
THEA 266	Voice and Movement for the Actor [1]	3
THEA 270 & THEA 220	Stagecraft and Stagecraft Lab	4
THEA 271 & THEA 221	Costume Craft and Costume Craft Lab	4
THEA 275	Theatrical Makeup Design	3
THEA 280	World Theatre	3
or THEA 115	World Film	
THEA 361	Acting III: Advanced Realism [1]	3
THEA 364	Advanced Acting	3
THEA 365	Directing I	3
THEA 368	Business of Acting [1]	3
THEA 450	Capstone Experience	3
THEA 461	Acting Shakespeare [1]	3
THEA 462	Acting Styles [1]	3
THEA 466	Advanced Voice for the Actor [1]	3
THEA 467	Advanced Movement for the Actor [1]	3
THEA 480	History and Literature of Theatre I	3
Theatre Practice - Repeatable for 8 credits:		8
THEA 210	Theatre Practicum (1-2 credits)	
THEA 211	Stage Management Practicum and Seminar (2 credits)	
Select two of the following:		6
THEA 160	Storytelling	
THEA 228	Development of Musical Theatre [1]	
THEA 345	Devising	
Select one from the following:		3
THEA 371	Introduction to Design: Scenic Design	
THEA 373	Lighting and Sound Design for the Theatre	

THEA 375	Costume Design for the Theatre	
Total Credits		**86**

1

Students must earn a minimum grade of 'B' in these dance and performance courses.

Minor Requirements

Minor: Theatre Arts

Required Credits: 20

Standard Option

Code	Title	Credits
Theatre Appreciation: Select 2 courses from the following:		6
THEA 110	Introduction to Theatre Arts	
THEA 180	Dramatic Literature and Style I	
THEA 280	World Theatre	
Theatre Practicum or Labs: Select 2 credits from the following		2
THEA 210	Theatre Practicum	
THEA 211	Stage Management Practicum and Seminar	
THEA 220	Stagecraft Lab	
THEA 221	Costume Craft Lab	
Electives: Select 12 credits from the following:		12
THEA 115	World Film	
THEA 160	Storytelling	
THEA 161	Acting I	
THEA 228	Development of Musical Theatre	
THEA 262	Introduction to Dance	
THEA 263	Dance Studio (repeatable up to 6 cr)	
THEA 266	Voice and Movement for the Actor	
THEA 270	Stagecraft	
THEA 271	Costume Craft	
THEA 275	Theatrical Makeup Design	
THEA 279		
THEA 345	Devising	
THEA 362	Dance Styles for Theatre (repeatable up to 3 cr)	
THEA 364	Advanced Acting	
THEA 365	Directing I	
THEA 371	Introduction to Design: Scenic Design	
THEA 373	Lighting and Sound Design for the Theatre	
THEA 375	Costume Design for the Theatre	
THEA 379	Global Seminar	
ENGL 380	Shakespeare	
Total Credits		**20**

Dance Option

Code	Title	Credits
Theatre Appreciation: Select 2 courses from the following:		6
THEA 110	Introduction to Theatre Arts	
THEA 161	Acting I	
THEA 180	Dramatic Literature and Style I	
THEA 280	World Theatre	
Theatre Practicum or Labs: Select 2 credits from the following		2

THEA 210	Theatre Practicum	
THEA 211	Stage Management Practicum and Seminar	
THEA 220	Stagecraft Lab	
THEA 221	Costume Craft Lab	
Dance Credits: Select 12 credits from the following:		12
THEA 262	Introduction to Dance	
THEA 263	Dance Studio (Can take up to 6 times)	
THEA 362	Dance Styles for Theatre (Can take up to 3 times)	
Total Credits		**20**

Minor Requirements and Notes

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

Tribal and Indigenous Peoples Studies

Department Information

- **Department Web Site:**
  library.ndsu.edu/search-find/research/research-assistance/tribal-indigenous-peoples-studies (http://library.ndsu.edu/search-find/research/research-assistance/tribal-indigenous-peoples-studies/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/tribal-indigenous-poeples-studies/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/tribal-indigenous-poeples-studies/)

North Dakota is the home of the Oceti Sakowin (Dakota, Lakota, and Nakota), Nueta, Sahnish, Hidatsa, and Anishinaabe peoples, in addition to many other diverse Indigenous peoples connected to these lands. There are five federally recognized Tribal Nations including Mandan, Hidatsa, & Arikara Nation (Three Affiliated Tribes), the Spirit Lake (Dakota) Nation, the Standing Rock (Lakota and Dakota) Sioux Tribe, the Turtle Mountain Band of Chippewa (Anishinaabe), and the Sisseton-Wahpeton Oyate (Dakota). Indigenous peoples have lived in North Dakota for over 10,000 years and remain a vibrant force in communities all over the region.

Tribal and Indigenous Peoples Studies builds strong communities through mutual understandings of our shared and complex history, shaped by settler colonialism and white supremacy, that continue to influence our relationships today. The minor is open to all NDSU students who wish to enhance their understanding of the history, culture, and contemporary issues of North American Indigenous populations and Indigenous populations on other continents.

THE PROGRAM

The requirements of the minor are flexible to allow students to create a program most beneficial to them. There is one required introductory course. To complete the other credits required for the 18 credit hour minor, students may choose from offerings in a variety of topics including Education, History, Literature, Anthropology, and Latin American Studies, among others. Students are welcome to transfer credit for courses from Tribal Colleges and other universities for Indigenous languages, or Native American or Indigenous studies courses.

WHAT WILL I LEARN

Students in the minor will be able to:

• describe the diversity of Indigenous history in a global context.

• reflect on Indigenous perspectives and cultural understandings.

• identify ongoing Indigenous issues at the regional, national, and international level, including the concept of and struggles over sovereignty and land rights.

• critically evaluate sources of knowledge about Indigenous peoples and histories.

HOW IT WILL IMPACT MY CAREER

A minor in Tribal and Indigenous Peoples studies will benefit any career choice. Students minoring in TIPS will be better equipped for careers in K-12 education, legal professions, social work, nursing and the health professions, environmental work, and any career that serves a culturally diverse population. TIPS minors will also apply their knowledge to benefiting the communities in which they live.

Tribal and Indigenous Peoples Studies

Department Information

- **Department Web Site:**
  library.ndsu.edu/search-find/research/research-assistance/tribal-indigenous-peoples-studies (http://library.ndsu.edu/search-find/research/research-assistance/tribal-indigenous-peoples-studies/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/tribal-indigenous-peoples-studies/ (http://catalog.ndsu.edu/programs-study/undergraduate/tribal-indigenous-peoples-studies/)

Minor Requirements

Minor: Tribal and Indigenous Peoples Studies

Required Credits: 18

Code	Title	Credits
TIPS 101	Introduction to Native American & Indigenous Studies (Introduction to Native American and Indigenous Studies)	3
Elective Courses - Select 15 credits from the following:		15
ANTH 445	Archaeology of Native North America	
ANTH 446	Anthropology of Latin America	
ANTH 458	Indigenous Peoples and Cultures of the Upper Midwest	
ANTH 479	(Community Based and Indigenous Archaeologies)	
EDUC 489	Teaching Students of Diverse Backgrounds	
ENGL 474	Native American Literature	
HIST 431	The North American Plains	
HIST 473	Colonial Mexico	
HIST 475	The Aztec, Maya, and Inca	
HIST 436	American Frontier to 1850	
SPAN 331	Introduction to Spanish American Civilization	
Total Credits		**18**

University Studies

Department Information

- **Department Web Site:**
  career-advising.ndsu.edu/ (http://career-advising.ndsu.edu/)
- **Credential Offered:**
  B.U.S.

The Bachelor of University Studies (B.U.S.) degree is a baccalaureate degree program offered through the College of Arts and Sciences, and is advised through the Career and Advising Center. The B.U.S degree is designed to provide a unique, nontraditional and interdisciplinary program for students whose goals and objectives cannot be met via a traditionally established academic major or minor. Courses taken include those that fulfill general education requirements, as well as others chosen for their appropriateness in achieving the goals of the individual student.

Degree Plan proposal

Students seeking the Bachelor of University Studies degree usually begin by visiting the Career and Advising Center and talking with an advisor about their long-range goals and aspirations. The advisor will work with the student in preparing the proposal, which includes, a statement of goals, a summary of previous education and experience, and a plan of study for the degree. After both have signed the proposal, it is forwarded to the Bachelor of University Studies Program Review Committee for approval. If the proposal is approved by the committee, it becomes a set of requirements for graduation. Each plan of study must meet the general education requirements and the graduation requirements of the university. The Bachelor of University Studies degree does not allow a designated major; instead a student will create an area or areas of emphasis that will help them attain

post-graduation goals. Each area of emphasis must include a minimum of 12 credits of study with at least six of those being upper division credits. In addition to the emphasis area a student may choose to declare an academic minor that they feel will strengthen their plan of study.

The degree plan must be submitted to the B.U.S. Program Review Committee by guideline due dates (October 1 for spring or summer graduation; February 1 for fall graduation). A minimum of 15 credits must be included in the proposal which are completed following approval by the Committee.

Career Opportunities

Employers have expressed enthusiasm for this degree program. It encourages students to think about the future long before graduation and helps them prepare for the kind of life they hope to lead following graduation. Students completing the B.U.S degree may plan careers in a wide variety of fields. Graduates work in health care, government, business, banking, sales, social work, publishing, and the military. Others have used their course work to prepare for further education and have attended medical school, PT school, OT school, law school and seminary, in addition to graduate school. If one can identify a career, one can make plans to achieve that goal.

For information, contact Jessica Bauer, Assistant Director, Student Success Initiatives, Career and Advising Center, 306 Ceres Hall, 701-231-6313 or email: jessica.m.bauer@ndsu.edu.

General Studies Option

The Bachelor of University Studies (B.U.S.) degree is a baccalaureate degree program offered through the College of Arts and Sciences, and is advised through the Career and Advising Center. The General Studies Option is for adults with prior college credits looking to return to school to finish their bachelor's degree. Students are able to take classes on campus or online, depending on their needs.

The Program

The Bachelor of University Studies: General Studies option allows for a flexible degree path for students looking to return to finish their bachelor's degree. Students must meet all general education requirements (p. 55) and graduation requirements (p. 66) as set by NDSU. An academic advisor from the Career and Advising Center will work with each student to determine eligibility of the program, remaining requirements, and the best path to degree.

Program Qualifications

Students who would like to pursue the Bachelor of University Studies: General Studies option, need to be eligible for and enrolled in the NDSU Degree Completion Program. Qualifications for this program are as follows:

- Students who do not hold a prior Bachelor's degree
- Students who have not been enrolled in an institution for a minimum of 2 years (24 consecutive months)
- Students who have earned a minimum of 60 credits
- Students who have a minimum 2.0 Cumulative Grade Point Average

Students who qualify for this program and have not attended NDSU for a minimum of 2 years are eligible to apply for Academic Forgiveness (p. 73).

Advising and Support
All students who are enrolled in the Degree Completion Program and working towards the General Studies Option of the B.U.S degree will be assigned an Academic Advisor and Career Coach from the Career and Advising Center. The Advisor and Career Coach will provide support to the student to make sure all academic and career needs are being met.

For more information, please visit the NDSU Degree Completion Program website: https://career-advising.ndsu.edu/ (https://career-advising.ndsu.edu/?page_id=29695&preview=true)**degree-completion-program**/. Contact Jessica Bauer, Assistant Director, Student Success Initiatives, Career and Advising Center, 306 Ceres Hall, 701-231-6313 or email: jessica.m.bauer@ndsu.edu.

University Studies

Department Information

- **Department Web Site:**
  career-advising.ndsu.edu/ (http://career-advising.ndsu.edu/)
- **Credential Offered:**
  B.U.S.
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/university-studies/ (http://catalog.ndsu.edu/programs-study/undergraduate/university-studies/)

Degree Requirements

Degree Type: Bachelor of University Studies (B.U.S)

Minimum Degree Credits to Graduation: 120

The Bachelor of University Studies (B.U.S.) degree is a baccalaureate degree program offered through the College of Arts, Humanities and Social Sciences, and is advised through the Career and Advising Center. The B.U.S degree is designed to provide a unique, nontraditional and interdisciplinary program for students whose goals and objectives cannot be met via a traditionally established academic major or minor. Courses taken include those that fulfill general education requirements, as well as others chosen for their appropriateness in achieving the goals of the individual student.

Degree Plan Proposal

Students seeking the B.U.S. degree will begin by working with an advisor to create the Bachelor of University Studies proposal, which includes a statement of goals, a summary of previous education and experience, and a proposed plan of study (i.e., remaining coursework) for the degree. After both have signed the proposal, it is forwarded to the Bachelor of University Studies Program Review Committee for approval. If the proposal is approved by the committee, it becomes the student's requirements for graduation. Each plan of study must meet the general education requirements (p. 55) (including the Capstone Experience, Cultural Diversity and Global Perspectives categories) and the graduation requirements (https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/degree-and-graduation/) of the university. The B.U.S. degree does not allow a designated major, instead a student will create an area or areas of emphasis that will help him or her attain post-graduation goals. Each area of emphasis must include a minimum of 12 credits of study with at least 6 of those credits being upper division credits. In addition to the emphasis area a student may choose to declare an academic minor that they feel will strengthen their plan of study. No fewer than 15 credits must be proposed (remain to be taken after approval) and included in the proposal.

The degree plan proposal must be submitted to the B.U.S Program Review Committee by guideline due dates (October 1 for spring or summer graduation; February 1 for fall graduation).

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

Code	Title	Credits
Requirements		**Credits**
Communications (C)		12
Quantitative Reasoning (R)		3
Science & Technology (S) (A laboratory course is included in this requirement.)		10
Humanities & Fine Arts (A)		6
Social & Behavioral Sciences (B)		6
Wellness (W)		2
Capstone		3
Total Credits		**42**

*Approval of a student's proposal means that the committee believes that the approved plan is the best educational program available to that student and that it is a baccalaureate-level program.

*It is the policy of the College of Arts, Humanities and Social Sciences that students seeking a B.U.S. degree will, following approval of the B.U.S Proposal, be expected to make continual progress toward
completion of their degree. Discontinuing enrollment for a period of two continuous academic years or more indicates lack of progress. The approved proposals of students who lack progress will no longer
be considered valid for graduation with a B.U.S. degree. If these students choose to continue to seek a B.U.S. degree, it will be necessary to submit a new proposal for consideration by the committee.

*In addition to the Bachelor of University Studies' continual progress policy, NDSU requires that any student who discontinues enrollment for more than one year is subject to completing the General
Education requirements in effect at the time of re-entry.

For further information, contact:

Career and Advising Center
306 Ceres Hall
NDSU Dept. 2802, P.O. Box 6050
North Dakota State University
Fargo, ND 58108-6050
Telephone: 701-231-7111
ndsu.cac@ndsu.edu

Degree Requirements

Degree Type: Bachelor of University Studies (B.U.S.)
Sub-Plan: General Studies
Minimum Degree Credits to Graduate: 120

The Bachelor of University Studies (B.U.S.) degree is a baccalaureate degree program offered through the College of Arts, Humanities and Social Sciences, and is advised through the Career and Advising Center (https://career-advising.ndsu.edu/).

Student who would like to pursue the Bachelor of University Studies: General Studies option, need to be eligible for and enrolled in the NDSU Degree Completion Program. Qualifications for this program are as follows:

- Students who do not hold a prior Bachelor's degree
- Students who have not been enrolled in an institution for a minimum of 2 years (24 consecutive months)
- Students who have earned a minimum of 60 credits
- Students who have a minimum 2.0 Cumulative Grade Point Average

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

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

Veterinary Technology

Department Information

- **Department Web Site:**
  www.ndsu.edu/agriculture/academics/academic-units/animal-sciences (http://www.ndsu.edu/agriculture/academics/academic-units/animal-sciences/)
- **Credential Offered:**
  B.S.
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/veterinary-technology/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/veterinary-technology/)

The veterinary technology program at North Dakota State University will prepare you for an exciting career in animal health care. As a veterinary technologist, you may choose to work in a large animal, small animal, exotic animal, or lab animal veterinary practice. Our graduates also find exciting careers in areas such as: serving as a research technician, working with breed and industry associations, veterinary sales and marketing, veterinary practice management, and animal#related business management. Many potential career opportunities await you as an NDSU veterinary technology graduate.

The Program

Veterinary Technology is a Bachelor of Science degree program within the Department of Animal Sciences. Departmental offices are located in Hultz Hall and Robinson Hall, on the west side of the main NDSU campus. Veterinarians and credentialed veterinary technologists comprise the primary faculty and staff, with other animal health and animal sciences professionals also teaching in the program.

The first year of the program is a pre-professional course of study that allows students the opportunity to decide if they want to apply for the limited-enrollment professional portion of the program. Courses offered to first year students include Introduction to the Veterinary Profession, Anatomy and Physiology of Domestic Animals, and Medical Terminology for the Paraprofessional. If, for any reason, you do not continue into the professional portion of the program, the credits earned during the first year may be transferred into other majors.

The professional portion of the program, which starts in the fall of the second year, is selective. Students must submit an application by the first week in May in order to be considered for admission into the professional program. Detailed application and selection information is provided during spring semester classes and is available at http://www.ndsu.edu/vettech (http://www.ndsu.edu/vettech/).

Professional Program Selective Admission

All students wishing to continue on in the professional program must submit supplemental application materials. Transfer students are encouraged to contact the department early for information if they intend to transfer to NDSU and pursue veterinary technology. In addition to the application form, students must complete the WONDERLIC Scholastic Entrance Exam, a personal interview with selection team members, and have completed VETS 115 - Medical Terminology. During the early summer, applications are evaluated and students are notified regarding program acceptance.

Professional Program

Topics in the professional portion of the program include veterinary nursing, clinical laboratory procedures, radiography, pharmacology, anesthesiology, hospital procedures, surgical nursing, and animal disease. Students work with a diverse group of animals, including cattle, sheep, pigs, horses, dogs, cats, birds, and exotics. In addition to lectures and demonstrations, students gain a great deal of practical experience. Professional program students participate in clinical practicums and, after successful completion of all the veterinary technology courses, enroll in a clinical externship. Most students complete their externship in a veterinary clinic, but students with particular interests have done their externships at facilities such as zoos, research laboratories, and animal rehabilitation facilities. Your entire academic career is planned to allow you to achieve your career goals and adapt to individual employment needs after you graduate. A minor in large animal veterinary technology, available only to veterinary technology majors, is available for students interested in careers working with livestock and/or horses.

Veterinary Technology Curriculum

With the guidance of your faculty advisor, you will formulate a course schedule that allows you to complete the veterinary technology program requirements. With the general elective courses necessary for graduation, you will be able to satisfy the requirements for a number of minor fields of study.

Financial Aid and Scholarships

Part-time work and work-study programs are available in several different livestock units, the equine center, and in animal science laboratories within the department. Over $50,000 in departmental scholarships are awarded to students within the Department of Animal Sciences, including Veterinary Technology majors, annually. In addition, the College of Agriculture, Food Systems, and Natural Resources awards scholarships each year to incoming freshman and current NDSU students. Veterinary Technology students may also apply for the LuAnn Lee Memorial Scholarship. For more information on college scholarships, visit https://www.ag.ndsu.edu/academics/scholarships (https://www.ag.ndsu.edu/academics/scholarships/).

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

The Veterinary Technology Club and Extra-Curricular Activities

The Veterinary Technology Club is open to any student interested in veterinary technology. It provides a social setting for students with common career goals and an opportunity to become involved in professional and community activities. The club meets twice monthly during the school year. Information about the club is available from the veterinary technology academic advisors.

NDSU offers a wide variety of other student led clubs, including the Saddle and Sirloin Club, Dairy Club, Rodeo Club, Horseman's Association, Collegiate Cattlewomen, Range Club, Anthrozoology Club, and Collegiate FFA.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ANSC 114	3	ANSC 223	2
ANSC 218	3	BIOL 111 or 150	3
ANSC 219	1	COMM 110	3
ENGL 110	3	ENGL 120	3
MATH 104	3	MICR 202	2
VETS 101	1	MICR 202L	1
		VETS 115	1
	14		**15**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CHEM 117 or 121	3	CSCI 114	3
VETS 249	2	VETS 255	2
VETS 265	2	VETS 255L	1
VETS 265L	1	VETS 267	2
VETS 296	1	VETS 267L	1
VETS 369	2	VETS 296	1
Gen Ed Quantitative Reasoning	3	VETS 385	2
		VETS 385L	1
		VETS 455	1
	14		**14**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
VETS 296	1	VETS 296	1
VETS 386	2	VETS 367	1
VETS 386L	1	VETS 367L	1

VETS 457	2	VETS 387	2
VETS 460	2	VETS 387L	1
VETS 460L	1	VETS 461	2
Gen Ed Hum & FA/Cult Div	3	VETS 461L	1
Free Elective	3	VETS 482	2
		VETS 483	1
		Gen Ed Soc & Beh Sci/Glob Persp	3
	15		**15**

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
ANSC 370	3	ANSC 371	3
VETS 485	3	Gen Ed Humanities & Fine Arts	3
Gen Ed Social & Behavioral Sciences	3	Gen Ed Wellness	2
Gen Ed Upper Division Writing	3	Free Electives	9
Free Electives	4		
	16		**17**

Total Credits: 120

Veterinary Technology

Department Information

- **Department Web Site:**
  www.ndsu.edu/agriculture/academics/academic-units/animal-sciences/ (http://www.ndsu.edu/agriculture/academics/academic-units/animal-sciences/)
- **Credential Offered:**
  B.S.
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/veterinary-technology/ (http://catalog.ndsu.edu/programs-study/undergraduate/veterinary-technology/)

Major Requirements

Major: Veterinary Technology

Degree Type: B.S.
Minimum Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

*****

Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Pre-Major Core Courses		
ANSC 218	Anatomy and Physiology of Domestic Animals *	3
ANSC 219	Anatomy and Physiology Laboratory *	1
VETS 101	Student Success Techniques: Veterinary Technology *	1
or ANSC 201	Student Success Techniques - Nontraditional & Transfer Students	
VETS 115	Medical Terminology for the Paraprofessional *	1
Required Vet Tech Core Courses		
VETS 249	Veterinary Hospital Information and Procedures *	2
VETS 255	Veterinary Diagnostic Imaging *	2
VETS 255L	Veterinary Diagnostic Imaging Laboratory *	1
VETS 265	Veterinary Nursing I *	2
VETS 265L	Veterinary Nursing Lab I *	1
VETS 267	Veterinary Nursing II *	2
VETS 267L	Veterinary Nursing Lab II *	1
VETS 296	Field Experience/Practicum (Ward Care / Clinic Care) [1]*	4
VETS 367	Principles of Companion Animal Dentistry *	1
VETS 367L	Principles of Companion Animal Dentistry Lab *	1
VETS 369	Companion Small Mammal and Exotic Animal Health and Husbandry *	2
VETS 385	Veterinary Parasitology *	2
VETS 385L	Veterinary Parasitology Lab *	1
VETS 386	Veterinary Hematology *	2
VETS 386L	Veterinary Hematology Lab *	1
VETS 387	Veterinary Clinical Pathology *	2
VETS 387L	Veterinary Clinical Pathology Laboratory *	1
VETS 455	Veterinary Applied Pharmacy Practices *	1
VETS 457	Veterinary Pharmacology *	2
VETS 460	Veterinary Anesthesiology *	2
VETS 460L	Veterinary Anesthesiology Lab *	1
VETS 461	Veterinary Surgical Nursing Techniques *	2
VETS 461L	Veterinary Surgical Techniques Laboratory *	1

VETS 482	Large Animal Techniques [*]	2
VETS 483	Clinical Veterinary Practicum [*]	1
VETS 485	Veterinary Technology Externship (Capstone Course) [*]	3
ANSC 114	Introduction to Animal Sciences [*]	3
ANSC 223	Introduction to Animal Nutrition [*]	2
ANSC 370	Fundamentals/Animal Disease [*]	3
ANSC 371	Fundamentals of Animal Disease II [*]	3
BIOL 111	Concepts of Biology (May satisfy general education category S)	3
or BIOL 150	General Biology I	
CHEM 117	Chemical Concepts and Applications (May satisfy general education category S)	3
or CHEM 121	General Chemistry I	
CSCI 114	Computer Applications (May satisfy general education category S)	3
or TL 116	Business Software Applications	
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab (May satisfy general education category S)	3
Total Credits		**72**

*****

Grade of 'C' required.

1

VETS 296 Field Experience (Ward Care / Clinic Care) requires multiple enrollments. Students are to register four different times for this one-credit course.

Degree Requirements and Notes:

- Transfer grades must be 'C' or better to count towards major requirements.
- The following minor programs of study are suggested to supplement this major program of study: Agribusiness, Animal Science, Business Administration, Equine Science, Large Animal Veterinary Technology, Microbiology, Psychology, or Range Science

Water Resources

Department Information

- **Department Web Site:**
  www.ndsu.edu/aben/ (http://www.ndsu.edu/aben/)
- **Credential Offered:**
  UG Certificate
- **Official Program Curriculum:**
  www.catalog.ndsu.edu/undergraduate/program-curriculum/water-resources/ (http://www.catalog.ndsu.edu/undergraduate/program-curriculum/water-resources/)

The water resources certificate is an interdisciplinary program for undergraduate students in their junior and senior years, focusing on water's journey and impact to the environment. The certificate requires 12 credits across key areas in hydrology fundamentals, soil and water contaminants management, and technological advances in water management. The program aims to equip students with the skills to tackle water resources challenges effectively. The Water Resources Certificate will prepare the students to enter careers in hydrology and water resources management.

Water Resources

Department Information

- **Department Web Site:**
  www.ndsu.edu/aben/ (http://www.ndsu.edu/aben/)
- **Credential Offered:**
  UG Certificate
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/water-resources/ (http://catalog.ndsu.edu/programs-study/undergraduate/water-resources/)

Certificate Requirements

Certificate: Water Resources

Required Credits: 12

Code	Title	Credits
Select one course from each category and one additional course from any category for a minimum of 12 credits.		
Hydrology		
Select one course from the following for hydrology:		3
ABEN 464	Resource Conservation and Irrigation Engineering	
ABEN 484	Drainage and Wetland Engineering	
CE 421	Open Channel Flow	
CE 474	Groundwater Sustainability Design	
CE 477	Applied Hydrology	
GEOL 414	Hydrogeology	
NRM 402	River and Stream Resource Management	
NRM 454	Wetland Resources Management	
or SOIL 454	Wetland Resources Management	
or RNG 454	Wetland Resources Management	
NRM 453	Rangeland Resources Watershed Management	
or RNG 453	Rangeland Resources Watershed Management	
Soil and Water Quality		
Select one course from the following for Soil and Water Quality:		3
CE 408	Water Resources and Supply	
CE 478	Water Quality Management	
ENVE 460	Environmental Fate and Transport	
GEOL 410	Sedimentology/Stratigraphy	
GEOL 412	Geomorphology	
or GEOG 412	Geomorphology	
GEOL 428	Geochemistry	
SOIL 410	Soils and Land Use	
SOIL 433	Soil Ecohydrology and Physics	
SOIL 444	Soil Genesis and Survey	
Technology		
Select one course from the following for Technology:		3
ABEN 482	Instrumentation & Measurements	
GEOL 465	Remote Sensing of the Environment	
or GEOG 465	Remote Sensing of the Environment	
CE 476	Watershed Modeling	
GEOL 470	Remote Sensing	
or GEOG 470	Remote Sensing	
GEOG 455	Introduction to Geographic Information Systems	
GEOG 456	Advanced Geographic Information Systems	
GEOG 480	Geographic Information Systems Pattern Analysis and Modeling	
SOIL 447	Microclimatology	
Additional Course		
Select one course from any category above.		3
Total Credits		**12**

Wellness

Department Information

- **Department Web Site:**
  www.ndsu.edu/hnes/ (http://www.ndsu.edu/hnes/)
- **Credential Offered:**
  Minor
- **Official Program Curriculum:**
  catalog.ndsu.edu/undergraduate/program-curriculum/wellness/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/wellness/)

The wellness minor takes an integrative approach to examining human health and wellness. The Dimensions of Wellness provides the framework in which students will gain knowledge and learn about skills needed to optimize health across the lifespan. Courses available within the minor represent a broad array of academic programs and departments, highlighting the interdisciplinary nature of human health and wellness and an opportunity for students to pursue areas of interest within the minor.

Wellness

Department Information

- **Department Web Site:**
  www.ndsu.edu/hnes/ (http://www.ndsu.edu/hnes/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/wellness/ (http://catalog.ndsu.edu/programs-study/undergraduate/wellness/)

Minor Requirements

Minor: Wellness

Required Credits: 18

Code	Title	Credits
Required Courses		
HNES 111	Wellness	3
HDFS 186	Smart Spending and Saving	3
HDFS 242	Couples, Marriages and Families	3
ADHM 410		3
or ADHM 411		
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 217		
RELS 100	World Religions	
SOC 115	Social Problems	
SOC 214	Social Interaction	
Total Credits		**18**

Minor Requirements and Notes:

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

Women and Gender Studies

Department Information

- **Department Web Site:**
  www.ndsu.edu/wgs/ (http://www.ndsu.edu/wgs/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Official Program Curriculum:**

catalog.ndsu.edu/undergraduate/program-curriculum/women-gender-studies/ (http://catalog.ndsu.edu/undergraduate/program-curriculum/women-gender-studies/)

The NDSU Women and Gender Studies program is an interdisciplinary academic program that focuses on women and gender issues in society, while integrating the teaching, research, and service goals of our land grant university. The undergraduate program offers a major and minor, and it has internal tracks that allow students to pursue focused studies in areas such as gender and public health. The Women and Gender Studies program requirements also complement various other degrees for students interested in double majoring.

CAREER OPPORTUNITIES (https://www.ndsu.edu/wgs/undergraduate_major_and_minor/major_and_minor/)

A Women and Gender Studies degree provides students with critical fieldwork experience that helps them find job placement after graduation. As a field committed to fostering justice for all, students are offered opportunities for working with local groups, organizations, and businesses that focus on women, gender, and sexuality. Students majoring in Women and Gender Studies complete an internship that places feminist theory into practice. Student experiences have included work with the YWCA, Rape and Abuse Crisis Center of Fargo-Moorhead, and others.

Upon graduation, our students are well poised to find positions that match their career goals or to pursue graduate programs. Increasingly, employers seek candidates who understand and support diversity and inclusiveness, which is a foundational principle in the Women and Gender Studies program. In NDSU's 2019 Career Placement Report, Women and Gender Studies graduates had 100% placement. Our graduates regularly find employment as social workers, directors of non-profit organizations, lawyers, lobbyists, counselors, professors, and librarians.

Program Learning Objectives

Women and Gender Studies examines gender in society and aims to raise students' aspirations, expand awareness of their capabilities, and widen the knowledge and development of all.

Upon graduation, Women and Gender Studies students will be able to:

1. Analyze how the social construction of gender and sex affects individual experiences
2. Examine how privilege and oppression function in society and culture
3. Explore how feminism and activism are intertwined by studying ways that diverse individuals, groups, and communities can work to affect change
4. Analyze how social categorizations of one's identity, such as race, gender, socioeconomic class, sexual orientation, and gender identity, intersect and affect a person's lived experiences
5. Construct evidence-based arguments within their own interdisciplinary fields of inquiry that use a variety of credible sources.
6. Explore the implications of engaged citizenship

The Curriculum

The Women and Gender Studies major (https://www.ndsu.edu/wgs/curriculum/) consists of a total of 33 approved semester credits. Students must take 7 core courses and 12 approved elective credits in their area of choice.

The Women and Gender Studies minor (https://www.ndsu.edu/wgs/undergraduate_major_and_minor/undergraduate_minor/) consists of a total of 18 approved semester credits. Students must take two required courses; then they may take four of any of the courses listed as core courses. Appropriate courses not on either the required or core list must be approved by the program administrators.

GENERAL EDUCATION

Multiple Women and Gender Studies classes--namely WGS 110: Introduction to Women's Studies, WGS 112: Introduction to Masculinities, and WGS 370: Transnational/Global Women-- fulfill both core requirements for the WGS major/minor as well as North Dakota State University's cultural diversity general education requirements. This allows students to advance towards a timely completion of their degree.

CONTACT

To begin your academic career in the WGS program, contact Dr. Ashley Baggett, at ashley.baggett@ndsu.edu.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years.Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (https://www.ndsu.edu/registrar/degreemap/) and Schedule Planner (https://www.ndsu.edu/onestop/degree-map-and-planning/) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year				
Fall	**Credits**		**Spring**	**Credits**
COMM 110		3	ENGL 120	3
ENGL 110		3	Gen Ed Humanities and Fine Arts	3
Gen Ed Humanities and Fine Arts		3	Gen Ed Science and Technology	3
Gen Ed Social & Behavioral Science		3	Gen Ed Soc & Beh Sci/Glob Persp	3
Gen Ed Science & Technology		3	Gen Ed Quantitative Reasoning	3
		15		**15**
Second Year				
Fall	**Credits**		**Spring**	**Credits**
WGS 110		3	WGS 350	3
WGS Major Elective		3	WGS Major Elective	3
Gen Ed Science & Technology w/Lab		4	Gen Ed Wellness	2
Free Electives		6	Free Electives	6
		16		**14**
Third Year				
Fall	**Credits**		**Spring**	**Credits**
HDFS 448		3	WGS 370	3
WGS Major Elective		3	WGS Major Elective	3
Free Electives		9	Gen Ed Upper Division Writing	3
			Free Electives	6
		15		**15**
Fourth Year				
Fall	**Credits**		**Spring**	**Credits**
SOC 424		3	WGS 489	3
Free Electives		12	WGS 426	3
			Free Electives	9
		15		**15**

Total Credits: 120

Women and Gender Studies

Department Information

- **Department Web Site:**
  www.ndsu.edu/wgs/ (http://www.ndsu.edu/wgs/)
- **Credential Offered:**
  B.S.; B.A.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/women-gender-studies/ (http://catalog.ndsu.edu/programs-study/undergraduate/women-gender-studies/)

Major Requirements

Major: Women & Gender Studies

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (p. 66) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (p. 58).

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

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Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†

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

Major Requirements

Code	Title	Credits
Women & Gender Studies Major		
SOC 424	Feminist Theory and Discourse	3
HDFS 448	Issues In Sexuality	3
WGS 110	Introduction to Women's Studies (May satisfy general education category A and D)	3
WGS 350	Perspectives in Women's Studies	3
WGS 370	Transnational/Global Women	3
WGS 426	Women in American History	3
WGS 489	Internship/Capstone	3
Major Electives: Select 12 credits from the following:		12
CJ 465	Gender, Race and Ethnicity in Criminal Justice	
COMM 216	Intercultural Communication (May satisfy general education category B and D)	
COMM 380	Health Communication I	
COMM 383	Organizational Communication I	
COMM 412	Gender and Communication	
ENGL 330	Women's Writing (May satisfy general education category A and D)	

ENGL 335	Multicultural Writers (May satisfy general education category A and D)
ENGL 454	Language Bias
ENGL 459	Researching and Writing Grants and Proposal
FREN 345	Women in French Literature
HDFS 230	Life Span Development (May satisfy general education category B)
HDFS 242	Couples, Marriages and Families (May satisfy general education category W)
HDFS 275	Diversity and Multiculturalism in Individual and Family Life
HDFS 353	Children, Families and Public Policy
HDFS 448	Issues In Sexuality
HDFS 468	Families and Work
HIST 259	Women in European History 1400-1800
HIST 426	Women in American History
PSYC 210	Human Sexuality (May satisfy general education category B)
PSYC 250	Developmental Psychology (May satisfy general education category B)
SOC 235	Cultural Diversity (May satisfy general education category B and D)
SOC 410	Social Inequality
SOC 412	Sociology of Gender (May satisfy general education category B and D)
SOC 417	Sociology of the Family
SOC 439	Social Change
WGS 112	Introduction to Masculinities (May satisfy general education category A and D)
WGS 340	Perspectives in LGBTQ Studies
WGS 496	Field Experience
Total Credits	**33**

Minor Requirements

Minor: Women & Gender Studies

Required Credits: 18

Code	Title	Credits
Required Courses		
WGS 110	Introduction to Women's Studies	3
WGS 350	Perspectives in Women's Studies	3
Core Courses: Select 12 credits of the following		**12**
CJ 310	Women and Policing	
CJ 465	Gender, Race and Ethnicity in Criminal Justice	
COMM 216	Intercultural Communication	
COMM 380	Health Communication I	
COMM 383	Organizational Communication I	
COMM 412	Gender and Communication	
ENGL 330	Women's Writing	
ENGL 335	Multicultural Writers	
ENGL 454	Language Bias	
ENGL 459	Researching and Writing Grants and Proposal	
FREN 345	Women in French Literature	
HDFS 230	Life Span Development	
HDFS 242	Couples, Marriages and Families	
HDFS 275	Diversity and Multiculturalism in Individual and Family Life	
HDFS 353	Children, Families and Public Policy	
HDFS 448	Issues In Sexuality	
HDFS 468	Families and Work	
HIST 259	Women in European History 1400-1800	
HIST 260		

POLS 350	Gender Issues and the Law
POLS 351	Women and Politics
PSYC 210	Human Sexuality
PSYC 250	Developmental Psychology
SOC 235	Cultural Diversity
SOC 417	Sociology of the Family
SOC 424	Feminist Theory and Discourse
SOC 439	Social Change
WGS 112	Introduction to Masculinities
WGS 340	Perspectives in LGBTQ Studies
WGS 370	Transnational/Global Women
Total Credits	**18**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU

Zoology

Department Information

- **Department Web Site:**
  www.ndsu.edu/biology/ (http://www.ndsu.edu/biology/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/biological-science/ (http://catalog.ndsu.edu/programs-study/undergraduate/biological-science/)

Minor Requirements

Minor: Zoology

Required Credits: 17

Code	Title	Credits
Required Courses		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 359	Evolution	3
Electives: 6 credits from the list below		**6**
BIOL 364	General Ecology	
BIOL 410	Comparative Chordate Morphology	
BIOL 450	Invertebrate Zoology	
BIOL 452	Ichthyology	
BIOL 454	Herpetology	
BIOL 456	Ornithology	
BIOL 458	Mammalogy	
BIOL 460	Animal Physiology	
BIOL 462	Physiological Ecology	
BIOL 463	Animal Behavior	
BIOL 475	Conservation Biology	
BIOL 476	Wildlife Ecology and Management	

BIOL 477	Wildlife and Fisheries Management Techniques	
Total Credits		**17**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- *Biological Sciences Majors: Electives taken for the Biological Sciences major cannot be double-counted with the Zoology minor. The only classes that can be double counted are BIOL 150/150L, 151/151L, and 359.*

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*** Available Online**

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***Available online**

Accountancy

Department Information

- **Program Coordinator:**
  Thomas D. Dowdell, Ph.D.
- **Phone:**
  Barry Hall 200C
- **Email:**
  thomas.dowdell@ndsu.edu
- **Department Phone:**
  (701) 231-8651
- **Department Web Site:**
  www.ndsu.edu/business/programs/graduate/macc/ (http://www.ndsu.edu/business/programs/graduate/macc/)
- **Application Deadline:**
  Applications are reviewed on a rolling schedule.
- **Credential Offered:**
  M.Acc.
- **Test Requirement:**
  GMAT 550 or GRE
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

The Master of Accountancy (MAcc) program at North Dakota State University (NDSU) is designed for students wishing to begin and/or accelerate their careers in public accounting, private industry, fraud investigation, and/or cost management. The MAcc program is a non-thesis delivered face-to-face in Barry Hall, located in downtown Fargo. This program emphasizes the technical competency, critical thinking, and analytical skills necessary for students to start and advance in their accounting careers. Students will be prepared to identify accounting issues, research the appropriate standards and tax law, analyze data, present possible solutions and recommend actions. In addition, students will enhance their ability to pass professional certifications, such as the Certified Public Accountant (CPA), Certified Management Accountant (CMA), and Certified Fraud Examiner (CFE).

Qualified students may complete the program in 11 months. However, students are welcome to earn their degree on a part-time basis. Students with undergraduate degrees in other areas of business or even unrelated to business may apply to the graduate program once they have completed the prerequisite accounting core courses, which include Intermediate Accounting I and II, Cost Accounting, Individual Taxation, and Audit I.

Through the College of Business, NDSU's MAcc program is fully accredited by the Association to Advance Collegiate Schools of Business (AACSB), the premier international accrediting agency in business administration and accounting.

Admission Requirements

1. Undergraduate degree from an Association to Advance Collegiate Schools of Business (AACSB*) accredited institution.
2. Minimum overall cumulative GPA of 3.0 on a 4.0 scale.
3. Minimum cumulative GPA for accounting upper-division courses of 3.0 on a 4.0 scale.
4. A GPA of at least 2.9 on a 4.0 scale is required for the following courses and at most one C:
   a. ACCT 311 (Intermediate Accounting I)
   b. ACCT 312 (Intermediate Accounting II)
   c. ACCT 320 (Cost Accounting)
   d. ACCT 418 (Tax I)
   e. ACCT 421 (Audit I)
5. If the requirements 1-4 are not satisfied, then a minimum score of 550 on the Graduate Management Admissions Test (GMAT) is needed for consideration.
6. A statement of purpose describing reasons for pursuing a Master of Accountancy (MAcc) degree.
7. Two letters of recommendation.**
8. Conditional admission is granted solely at the discretion of the M.Acc. Director and/or the M.Acc. committee.

Specific instructions for graduates with a bachelor's degree from:

A. Non-NDSU North Dakota four-year, not-for-profit schools and Tri-College schools

i. Requirements 2 - 7 should be satisfied to apply for consideration.

B. All other regionally accredited schools, including those located internationally

i. Requirements 2 – 4, 6, and 7 should be satisfied to apply for consideration.

ii. Requirement 5 is not applicable.

iii. A GMAT with a minimum score of 550 is required by all.

* Click here to view a list of AACSB-accredited schools. (https://www.aacsb.edu/accredited/)

** Not required for NDSU accounting undergraduates.

All international applicants are required to complete Graduate School application requirements listed at https://www.ndsu.edu/gradschool/apply/international ***(***https://www.ndsu.edu/gradschool/apply/international/***)* and submit a course-by-course transcript evaluation from World Education Services (WES). See** www.wes.org **(**http://www.wes.org/**).**

Financial Assistance: The department offers semester-long assistantships on a competitive basis. The M.Acc. Director will send the application for the assistantship to all eligible students who have applied to the program by the application deadlines.

Program Curriculum

The total course requirements necessary to complete the 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. Please refer to the core accounting course list at the end of this page. A student with an academic background in accounting will need to take ten (10) graduate-level courses (30 semester credit hours) and may complete the degree in as little as eleven months depending on the number of courses a student desires to take in a semester. Students may choose to pursue the degree on a part-time or a full-time basis.

The graduate course work for the M.Acc. degree includes four required courses in applied professional research, financial statement analysis, and information technology audit and risk management, and advanced topics in management accounting. In addition, the student must take three accounting electives from a list of eight courses that includes fraud examination, taxation, management control systems, advanced auditing, and advanced financial accounting and analysis. Finally, the student must take nine graduate elective credits, six of which must be STEM-designated, from a list of approved courses or with permission of the graduate program coordinator.

Code	Title	Credits
ACCT 735	Applied Professional Research	3
ACCT 755	Financial Statement Analysis	3
MIS 770	Information Technology Audit and Risk Management	3
ACCT 740	Advanced Topics in Management Accounting	3
Select three (3) courses from the following:		9
ACCT 610	Fraud Examination [1]	
ACCT 611	Advanced Fraud Examination via Data Analytics [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 722	Auditing II	
ACCT 725	International Financial Reporting Standards	
Choose a minimum of 9 credit hours' worth of courses from the list and 6 of them must be STEM-qualified electives		9
ACCT 696	Special Topics	
ACCT 793	Individual Study/Tutorial	
FIN 610	Investment Analysis and Management [1]	
FIN 630	Management of Financial Institutions [1]	
MBA 721	Creating and Marketing Innovations [3]	
MBA 722	Marketing Analytics and Customer Intelligence [3]	
MBA 723	Digital Marketing [3]	
MBA 751	Business Analytics Concepts [3]	
MBA 752	Business Analytics Strategy [3]	
MBA 753	Business Analytics Methods [3]	
MIS 650	Enterprise Systems [3]	
MIS 679	[3]	

MIS 720	Visualization and Reporting [3]
MIS 790	Graduate Seminar [3]
MIS 710	Database Management [3]
MIS 740	Advanced Business Analytics Methods [3]
TL 711	Integrated Supply Chain System [3]
TL 715	Introduction to ERP [3]
TL 725	ERP Configuration [3]
TL 735	Practical Data Analytics [3]
MRKT 610	Consumer Behavior [1]
MGMT 650	Human Resource Management [1]
Students cannot take the 600-level course if they took the 400-level course. [1]	
The elective course must be pre-approved by the Master of Accountancy (MAcc) Director in writing. [2]	
STEM qualified elective. [3]	
Total Credits	**30**

1

Students cannot take the 600-level course if they took the 400-level course

2

Summer courses are offered when student enrollment numbers meet the required minimum.

CORE UNDERGRADUATE ACCOUNTING COURSES: You must have completed the following courses or their equivalent.

Code	Title	Credits
ACCT 311	Intermediate Accounting I	4
ACCT 312	Intermediate Accounting II	4
ACCT 320	Cost Management Systems	3
ACCT 418	Tax Accounting I	3
ACCT 421	Auditing I	3

Faculty

James W. Clifton, CPA, CFE
Assistant Professor of Accounting Practice
Specialty: Accounting, Fraud, and Taxation

Thomas D. Dowdell, Ph.D.
Professor
Specialty: Accounting and Auditing

Nancy J. Emerson, CPA, MAS
Senior Lecturer
Specialty: Accounting and Government/Nonprofit Accounting

Yongtao (David) Hong, Ph.D.

Professor
Specialty: Advanced Accounting, International Standards, and Theory

Michael J. Petersen, Ph.D., CMA, CFM
Associate Professor
Specialty: Financial Accounting and Cost Management

Adult-Gerontology Acute Care Nurse Practitioner

Department Information

- **Department Location:**
  School of Nursing
- **Department Phone:**

(701) 231-7395

- **Department Email:**
  ndsu.nursing@ndsu.edu
- **Department Web Site:**
  https://www.ndsu.edu/nursing/
- **Credential Offered:**
  Certificate

This certificate is for students who have graduated from an accredited graduate Family Nurse Practitioner program.

Some of the courses are offered using distance teaching strategies. Graduates will be prepared for eligibility for the American Nurses Credentialing Center's Acute Care NP exam or the American Academy of Critical Care Nurses (AACN) exam.

Code	Title	Credits
Introduction to Acute Care Practice, Advanced Therapeutics & Diagnostics		2
Adult-Gerontology Management I		2
Adult-Gerontology Clinical I		4
Adult-Gerontology Management II		3
Adult-Gerontology Clinical II		4
Procedures for AGACNPs		3
Adult-Gerontology Clinical III		5
Adult-Gerontology Management III		2
Total Credits		**25**

Adult Learning

Department Information

- **Department Location:**
  School of Education - Family Life Center 210
- **Department Phone:**
  (701) 231-7101
- **Department Web Site:**
  ndsu.edu/education/ (http://ndsu.edu/education/)
- **Application Deadline:**
  July 1 - fall semester; December 31 - spring semester
- **Credential Offered:**
  Certificate

The Graduate Certificate in Adult Learning is designed for individuals who are interested in, or are already working in, training and education roles within educational programming for adult learners. Whether in a professional work environment or in an educational setting, adult learners require an instructional approach that integrates facilitation and collaboration in order to meet learning outcomes. This certificate prepares professionals with the knowledge and skills essential to becoming an effective educator of adults.

This program is designed to enhance knowledge and skills in:

- Adult learning theory
- Curriculum design and instruction
- Learner assessment
- Foundations of adult education

This program is open to everyone with a baccalaureate degree who is interested in working with adult learners in educational or workplace settings. Current graduate students can also add this certificate to their plan of study.

Course Requirements

Course Requirements

Code	Title	Credits
EDUC 851	Adult Learning	3
EDUC 852	Foundations of Occupational & Adult Education	3
EDUC 853	Instructional Methods for Adult Learners	3
Total Credits		**9**

Agribusiness and Applied Economics

Department Information

- **Graduate Coordinator:**
  Siew Hoon Lim
- **Email:**
  siew.lim@ndsu.edu
- **Department Location:**
  500 Barry Hall
- **Department Phone:**
  (701) 231-7441
- **Department Email:**
  ndsu.agribusiness@ndsu.edu
- **Department Web Site:**
  www.ag.ndsu.edu/agecon/ (http://www.ag.ndsu.edu/agecon/)
- **Application Deadline:**
  March 1 for fall semester; October 1 for spring semester
- **Credential Offered:**
  M.S.
- **Test Requirement:**
  GRE or GMAT
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

The Master of Science degree program in Agribusiness and Applied Economics offers coursework focusing on applied economics, agribusiness, risk analysis, international trade, and transportation and logistics.

The applied economics course work in economic theory, research methods, and quantitative techniques is designed to prepare students for careers in agricultural economics research in private and public sectors and for Ph.D. programs.

The agribusiness courses are broad-based and combine training in agribusiness management, economic analysis, and agricultural sciences. 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.

Students have complete access to well-equipped research facilities and to faculty supervision time. The department has an excellent placement record with national and international agricultural and business firms, as well as government agencies.

In addition to the Graduate School admission requirements (https://bulletin.ndsu.edu/graduate/admission-information/), applicants to the program must have earned a grade of B or higher in intermediate microeconomics and statistics including linear regression, and a grade of C or better in calculus.

Students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but show potential for successful graduate study, may be admitted under a conditional status. Evidence must be provided showing that the applicant's potential is not adequately reflected by his/her record. After meeting the specified standards of performance set by the department, the student, in consultation with the major adviser, may request a change to full graduate standing.

Financial Assistance

The department offers assistantships on a competitive basis. Granting assistantships depends on academic performance, departmental needs, and availability of assistantships. Most assistantships are half-time (20 hours per week) or one-quarter-time (10 hours per week). Assistantships are typically limited to 16 months.

Graduate Research Assistantships (GRAs) provide monthly stipends. Students on assistantship perform research or teaching duties in the department in return for their stipend.

In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

All students pursuing a Master of Science in Agribusiness and Applied Economics must complete all core courses. Students select elective courses (with approval of the adviser and supervisory committee) to fulfill the remaining Graduate College credit requirements. Students must have competence in calculus, multiple regression analysis, and intermediate microeconomics.

Code	Title	Credits
Required Courses (both options)		**10**
AGEC 701	Research Methods	
ECON 710	Advanced Econometrics	
AGEC 739	Analytical Methods for Applied Economics	
AGEC 741	Advanced Microeconomics	
Plan A: Thesis Option		
Courses numbered 601-689, 691; 700-789, 791; 800-889 and 891		10-14
AGEC 798	Master's Thesis (6-10 credits)	
Plan B: Comprehensive Study Option		
ECON 610	Econometrics	
Courses numbered: 601-689, 691; 700-789, 791; 800-889 and 891		13-15
AGEC 797	Master's Paper (2-4 credits)	
Minimum Total Credits:		30

Kwame Addey, Ph.D.
North Dakota State University, 2023
Research Interests: International Trade, and Financial Markets (Statistical Arbitrage)

Jon Biermacher, Ph.D.
Oklahoma State University, 2005
Research Interests: Economics of Livestock Production, Crop Production and Marketing Systems, Technology and Biotechnology Adoption, and Rural and Community Economic Development

David Bullock, Ph.D.
Iowa State University, 1989
Research Interests: Futures and Options Markets, Over-The-Counter Derivatives, Trading, Risk Management, Agrifinance, Monte Carlo Simulation, and Big Data Applications in Agriculture

James Caton, Ph.D.
George Mason University, 2016
Research Interests: Entrepreneurship Agent-based Computational Economics, Market Process Theory, Monetary Economics

Erik Hanson, Ph.D.
University of Minnesota, 2016
Research Interests: Agricultural Finance, Farm Management, Marketing and Production Economics

Ron Haugen, M.S.
North Dakota State University, 1989
Research Interests: Farm Management

Robert Hearne, Ph.D.
University of Minnesota, 1995
Research Interests: Natural Resource and Environmental Economics

Jeremy Jackson, Ph.D.
Washington University in St. Louis, 2008
Research Interests: Microeconomics, Political Economy, Public Finance

Thomas Krumel, Ph.D.
University of Connecticut, 2020
Research Interests: Rural Development, Labor Demand, and Labor Market Skills Mismatch

Siew Hoon Lim, Ph.D.
University of Georgia, 2005
Research Interests: Production Economics, Transportation, Industrial Organization

Raymond March, Ph.D.
Texas Tech University, 2017
Research Interests: Public and Private Provision and Governance of Health Care in the United States

Dragan Miljkovic, Ph.D.
University of Illinois, 1996
Research Interests: Agricultural Prices, International Trade, Agricultural and Food Marketing and Policy

William Nganje, Ph.D.
University of Illiniois at Urbana-Champaign, 1999
Research Interests: Agricultural Finance, Food Safety Economics

Frayne Olson, Ph.D.
University of Missouri, 2007
Research Interests: Crop Marketing Strategies, Crop Supply Chain Management, Agricultural Contracting, Agricultural Risk Management

Bryon Parman, Ph.D.
Kansas State University, 2013
Research Interests: Whole Farm and Agribusiness Financial Structure, Risk Management, Land Values and Rents, and Farm Financial Trends

Timothy Petry, M.S.
North Dakota State University, 1973
Research interests: Livestock Marketing

Veeshan Rayamajhee, Ph.D.
University of New Mexico, 2019
Research Interests: Individual and Collective Responses to Covariate Shocks

David Ripplinger, Ph.D.
North Dakota State University, 2011
Research Interests: Production Economics and Marketing

David Roberts, Ph.D.
Oklahoma State University, 2009
Research Interests: Natural Resource and Environmental Economics, Econometrics, Production Agriculture

Anupa Sharma, Ph.D.
Virginia Polytechnic Institute and State University, 2016
Research Interests: Economics, Agriculture Business and Management

Sandro Steinbach, Dr. Sc.
ETH Zurich, Swiss Federal Institute of Technology, 2018
Research Interests: International Trade and Agricultural Policy

Cheryl J. Wachenheim, Ph.D.
Michigan State University, 1994
Research Interests: Agribusiness

William W. Wilson, Ph.D.
University of Manitoba, 1980
Research Interests: Commodity Marketing, Agribusiness, Industrial Organization

An accelerated Master of Science program is available for students currently enrolled in the undergraduate economics, agricultural economics, and agribusiness programs at North Dakota State University. Students will be required to complete 30 credits consisting of at least 16 graduate-level didactic credits (600/700 level), maintain a graduate GPA of 3.0, and complete a thesis or paper.

A maximum of 15 didactic graduate credits can be used to meet the requirement for the Bachelor of Science (B.S.) degree, and at least 9 of the 15 graduate credits must be 700-level AGEC/ECON courses. Course substitution must be approved by the Department Chairperson. Interested and eligible students must contact the Graduate Program Coordinator *before* applying.

Graduate stipend or assistantship will not be provided until B.S. degree is granted. However, students are eligible for hourly funding (i.e., time slip) if available at any time after being accepted into the accelerated MS program. Upon completion of the B.S. degree requirement, students are eligible for

assistantships pending availability. Differential tuition applies. Graduate tuition rates will apply to graduate level courses while undergraduate tuition applies to undergraduate courses.

Eligibility and Admission

An Accelerated Degree Program Declaration Form (https://powerforms.docusign.net/b40bdfd4-58b2-46bb-8fb3-3a890efd93de/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) is required and should be submitted before applying to the program.

At the time of application, the student:

- Must have completed at least 60 credits towards their B.S. degree before conditional admission.
- Must have completed at least 30 credits at NDSU before conditional admission.
- Must have a cumulative GPA of 3.5 at NDSU to be eligible for conditional admission.
- Must have completed intermediate microeconomics (ECON 341) with a grade of B or higher, calculus (Math 144 or higher) with a grade of C or higher, and linear regression (STAT 331 or 461) with a grade of B or higher.

Rules for Accepted Students

All admissions are conditional. The minimum condition is completion of the B.S. degree prior to full standing in M.S. program.

- No undergraduate courses (100-400) may be counted toward a M.S. degree.
- Courses completed at the 600 level prior to being accepted to the program may be counted toward a M.S. degree.
- A maximum of 15 credits in the M.S. program can be used to meet the requirements for the B.S. degree; 9 of the 15 credits must be 700-level didactic AGEC/ECON courses.
- Students entering the M.S. degree program with a B.S. degree in hand may not use courses earned as part of the bachelors program for the M.S. requirements.
- The student must meet all of the requirements that would normally be expected of a student in the M.S. program.
- Graduate stipend or assistantship will not be provided until B.S. degree is granted. However, students are eligible for hourly funding (i.e., time slip) if available. Upon completion of the B.S. degree requirement, students are eligible for assistantships pending availability.

Degree Requirements for Accelerated Masters of Science Program

Student must meet all requirements of the Economics, Agribusiness, or Agricultural Economics B.S.; and Agribusiness and Applied Economics M.S. programs to be awarded these degrees. The Graduate School has the following minimum requirements:

- Minimum of 30 credits total.
- Minimum of 16 course credits in 601-689 and/or 700-789 level.

Student Focused. Land Grant. Research University.

Agricultural and Biosystems Engineering

Department Information

- **Department Chair:**
  Leon Schumacher, Ph.D.
- **Graduate Coordinator:**
  Igathinathane Cannayen, Ph.D.
- **Department Location:**
  Agricultural and Biosystems Engineering Building
- **Department Phone:**
  (701) 231-7261
- **Department Web Site:**
  www.ndsu.edu/aben/ (http://www.ndsu.edu/aben/)
- **Application Deadline:**
  International applications are due May 1st for fall and October 1 for spring. Domestic applications must be received at least one month prior to the start of the semester.
- **Credential Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

The Department of Agricultural and Biosystems Engineering (ABEN) offers graduate study leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees. The program emphasizes solving engineering problems for agricultural production, food and biofuels processing, and environmental resources management. Advanced work may involve specialized training in the following areas: irrigation and drainage engineering; agricultural hydrology; soil and water resources management; livestock waste management; air quality, process engineering for food and biofuels, and other bioproducts; agricultural machine systems; precision agriculture; machine vision and intelligent sensors for biological systems; and post-harvest handling and storage of biomass feedstocks and other biological materials.

Student research and academic programs are tailored to individual student needs and interests. Interdisciplinary approaches to agricultural and biosystems engineering programs are fostered.

The ABEN graduate program is open to all qualified graduates of universities and colleges of recognized standing. To receive full standing admission to the program, the applicant must meet the Graduate College's admission requirements and have a baccalaureate degree in engineering or have taken the equivalent of the basic undergraduate engineering courses.

The following fundamental courses (or their equivalent) must be taken prior to receiving a M.S. or Ph.D. degree from the North Dakota State University (NDSU) ABEN department. 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. Note that students are responsible for paying the tuition for undergraduate courses.

- 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)

The major adviser may appeal to the ABEN graduate committee (not the student's supervisory committee) for substitutions or waivers of these requirements.

Financial Assistance

Research assistantships are available and dependent on the grant funding of faculty research programs. Applicants are considered based on scholarship and potential to undertake advanced study and research. Students are eligible for an assistantship when accepted into the Graduate College.

M.S. Degree

The M.S. degree program requires completion of 30 semester credit hours beyond the baccalaureate degree as detailed below. A Plan of Study (PoS) is 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 the M.S. degree.A cumulative GPA of 3.0 or higher is required.

Code	Title	Credits
Didactic Course Work (601-689, 691; 700-789, 791; 800-889 and 891)		**16**
ABEN 790	Graduate Seminar	
Additional Credits (as needed to complete 30 total credits)		
ABEN 798	Master's Thesis	6-10
Total Credits Required		**30**

Code	Title	Credits
Accelerated M.S. in Agricultural and Biosystems Engineering		
Students pursuing an accelerated master's degree in ABEN must complete the following requirements:		
Didactic Course Work (601-689, 691; 700-789, 791; 800-889 and 891)		20-24
ABEN 798	Master's Thesis	6-10
ABEN 790	Graduate Seminar	1-3
Total Credits		30

A maximum of 15 graduate credits earned in the accelerated degree program may be used towards the undergraduate and graduate degree.

*
Minimum of 6 credits of NDSU ABEN courses numbered 601-689, 691; 700-789, 791

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 College requirements. The student's academic adviser is usually assigned during the acceptance process. Prior to the end of the first academic year, the student and academic adviser will arrange for appointment of a supervisory committee.

Code	Title	Credits
Didactic credit (601-689, 691; 700-789, 791; 800-889 and 891)*		**27**
ABEN 899 and ABEN 790		**30-45**
Additional Credits (as need to complete 60 credits (post-master's) or 90 credits (post-bachelor's)		
Total credits		**60-90**

*
at least 15 credits of which must be 700-800 level and a minimum of 9 credits must be ABEN courses.

- 60 credits after the M.S. or 90 credits after the B.S.
- A minimum of 30 credits of NDSU ABEN dissertation and graduate seminar after the M.S. or 45 credits after the B.S.
- A minimum of 9 credits of NDSU ABEN courses numbered 601-689 or 700-789, 15 credits if entering with other than an ABEN B.S.
- 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 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 receive 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 academic adviser also coordinates the oral examination. 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 the research problem, and how he/she is applying scientific and engineering principles to solve the research problem. The committee may further use this examination to 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 is notified of the deficiencies and 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 College 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 final examination on the dissertation.

Final examination

After the research work is completed, the student will write a Ph.D. dissertation following the guidelines of the Graduate College. The final oral Ph.D. examination will be arranged after the approval of the academic adviser. The student must distribute the complete Ph.D. dissertation 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 College to complete the submission of the Ph.D. dissertation.

Igathinathane Cannayen, Ph.D.
Indian Institute of Technology, 1997

Research Interests: Biomass Harvest, Storage, Collection and Pre-Processing

J. Paulo Flores
Federal University of Rio Grande do Sul, 2008
Research Interests: Precision Agriculture, Applications of UASs/Drones in Agriculture, UASs/Drone Imagery Analysis, GIS Applications for Precision Agriculture

Kenneth J. Hellevang, Ph.D.
North Dakota State University, 1989
Research Interests: Post Harvest Technology, Structures

Xinhua Jia, Ph.D.
University of Arizona, 2004
Research Interests: Soil and Water Engineering, Hydrology

Zhulu Lin, Ph.D.
University of Georgia, 2003
Research Interests: Water and Soil Resources, Environmental Modeling

Ewumbua Monono, Ph.D.
North Dakota State University, 2015
Research Interests: Application of Engineering to the Science of Bioprocessing, Biofuels, Bioproducts, and Food Safety Engineering

John Nowatzki, M.S.
North Dakota State University, 1974
Research Interests: Agricultural Machine Systems, Precision Agriculture, Conservation Technology, Farm Equipment Energy Conservation, Energy Efficiency, Farm Chemical Application Technology, Wireless Technology on Farms

Matthew Olhoft, M.S.
North Dakota State University
Research Interests: Education, General Agriculture, Agricultural Mechanics, Leadership, Youth Organizations

Scott W. Pryor, Ph.D.
Cornell University, 2005
Research Interests: Biorenewable Products and Bioprocessing

Thomas S. Scherer, Ph.D.
University of Minnesota, 1986
Research Interests: Soil and Water Resources Management, Irrigation Systems

Dean D. Steele, Ph.D.
University of Minnesota, 1991
Research Interests: Irrigation and Environmental Engineering

Xin (Rex) Sun, Ph.D.
Nanjing Agricultural University, 2013
Research Interests: Precision Agriculture, Artificial Intelligence in Food and Agriculture, Precision Livestock Production, Meat Quality Non-destructive Detection Methods

Zhao Zhang, Ph.D.
Pennsylvania State University, 2015
Research Interests: Sensing and Automation in Agricultural and Precision Agriculture

Agricultural Education

Department Information

- **Department Chair:**
  Leigh Ann Skurupey, Ph.D.
- **Program Coordinator:**
  Adam Marx, Ph.D.
- **Email:**
  adam.marx@ndsu.edu
- **Department Location:**

EML 155C

- **Department Phone:**
  (701) 231-7921
- **Application Deadline:**
  Applications will be accepted up to 3 weeks prior to the start of a new semester. Contact department with questions.
- **Credential Offered:**
  M.S., M.Ed.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6, Duolingo 105

The Department Agricultural and Family Education (https://www.ndsu.edu/agriculture/academics/academic-units/agricultural-and-family-education/) offers graduate study leading to the Master of Education (M.Ed.) and Master of Science (M.S.) degrees in Agricultural Education. Advanced work may involve specialized training in vocational education, extension education, international extension, and agricultural education. Within the Master of Education (M.Ed.) students may also pursue the Agricultural Education Teacher Licensure Option to seek their teaching license through a post-baccalaureate pathway.

Online Delivery

All coursework is available for candidates completely at a distance to meet your professional and personal needs. The master's degree program in Agricultural Education is most ideally suited for current school-based agricultural educators. However, the degree program is modular enough to meet the needs of students seeking advancement and expertise in multiple disciplines. Core coursework will prepare students to evaluate educational programs which they currently or intend to lead with a blended focus on adolescent and adult educational development. Further, coursework extends principles of baccalaureate teacher preparation in agriculture. Foundational coursework in research and evaluation methods are taught in a practical and applied manner.

Degree programs are planned cooperatively to meet the needs of individual students. Some courses focus on problems related to various phases of Agricultural Education, including secondary, post-secondary, adult, and extension programs. Others emphasize issues common to all service areas in agricultural and extension education. Candidates should work closely with an adviser.

The North Dakota State University (NDSU) programs in education are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and are approved by the North Dakota Education Standards and Practices Board.

Options with IDEA

- https://www.idea.org/program/agricultural-education **(**https://www.gpidea.org/program/agricultural-education/**)**
- May have a focus on the secondary classroom, post-secondary environments, extension, leadership, or agricultural communications

In addition to the Graduate College's required application materials, the program requires submission of a statement of career goals as well as reasons for applying to the program.

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 Master of Education (M.Ed.) degree is a non-thesis, practitioner-oriented degree that has three options. The first option is for currently licensed teachers. The second option is for those seeking initial teacher licensure. Candidates for this option will have earned a bachelor's degree in an agriculture or closely related area. Candidates must meet all requirements of related TLO program: www.ndsu.edu/ted/graduate/teacher_licensure_option/. NDSU has a dual degree program with Dickinson State University that provides a teacher licensure opportunity. Refer to DSU/NDSU Degree Plan for BS Credit requirements. Students must be enrolled at Dickinson State University at the time of application to the Collaborative Ag Ed TLO program.

The Master of Science (M.S.) degree requires a master's thesis or master's paper.

Master's programs within the School of Education require a minimum of 30 semester credits (minimums vary by academic program). Programs vary on requiring a written comprehensive exam or a portfolio/oral.

> ***NOTE:*** Earning an academic/professional degree does not necessarily lead to state credential or licensure. People seeking licensure must provide evidence of the required number of years of teaching or counseling, and, in the case of school administration, administrative experience. Potential and current students should consult with the appropriate academic program coordinator for advice about licensure, certification, or credentialing after communicating with the appropriate state official.

Code	Title	Credits
Plan A - Licensed Teachers - M.Ed.		
Core Courses		12

EDUC 750	Reflective Practice and Research in Education	
EDUC 751	Students and Their Learning	
EDUC 732	Curriculum, Instruction and Learning Theory	3
or EDUC 752	Curriculum Design and Delivery	
EDUC 753	Managing/ and Monitoring Learning	
Concentration		12
H&CE 724	Program Planning in School-Based and Extension Programs	
H&CE 740	Advanced CTE Philosophy and Policy	
H&CE 743	Experiential and Learner-Centered Instruction	
H&CE 756	Program Development and Evaluation	
H&CE 781	Professional Development in Agricultural Education	
H&CE 787	Issues In Education	
H&CE 795	Field Experience	
Electives (as approved by adviser)		
H&CE 794	Practicum/Internship	3
Total Credits		**30**

Code	Title	Credits
Plan B - Teacher Licensure Option (TLO)		
H&CE 232	Philosophy and Policy (CTE licensure requirement, not M.Ed. degree eligible)	
EDUC 651P	Instructional Planning, Methods and Assessment	3
EDUC 686	Classroom Management for Diverse Learners	3
EDUC 689	Teaching Students of Diverse Backgrounds	3
EDUC 724	Advanced Educational Psychology	3
H&CE 667	Leading Youth Organizations	3
or H&CE 644	Planning the Community Program in Agriculture	
H&CE 680	Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education	3
H&CE 681P	Methods of Teaching Agriculture	3
H&CE 683P	Student Teaching Seminar	1
H&CE 687P	Student Teaching	5
H&CE 688P	Applied Student Teaching	3
Total Credits		**30**

DEGREE REQUIREMENTS AND NOTES

- Courses taken with a Pass/Fail grading basis may not be used to satisfy any degree requirement.
- A grade of 'C' or better is required in all required EDUC and H&CEcourses.
- To be placed in student teaching in Plan B and C, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program in Plan B and Plan C, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is are required, as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.

Code	Title	Credits
Plan C - Dickinson State University and NDSU Dual Degree - Teacher Licensure Option		
EDUC 651P	Instructional Planning, Methods and Assessment	3
EDUC 686	Classroom Management for Diverse Learners	3
EDUC 689	Teaching Students of Diverse Backgrounds	3
H&CE 667	Leading Youth Organizations	3
or H&CE 644	Planning the Community Program in Agriculture	
H&CE 646	Extension Education (optional)	3
H&CE 680	Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education	3
H&CE 681P	Methods of Teaching Agriculture	3

H&CE 683P	Student Teaching Seminar	1
H&CE 687P	Student Teaching	5
H&CE 688P	Applied Student Teaching	3
Total Credits		**30-33**

DEGREE REQUIREMENTS AND NOTES

- Courses taken with a Pass/Fail grading basis may not be used to satisfy any degree requirement.
- A grade of 'C' or better is required in all required EDUC and H&CE courses.
- To be placed in student teaching in Plan B and C, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program in Plan B and Plan C, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is are required, as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.

Adam A. Marx, Ph.D.
University of Missouri, 2014
Research Interests: Adolescent Career Decision-Making, Student Engagement, Teacher Development

Brooke Thiel, Ph.D.
North Dakota State University, 2020
Research Interests: Career Readiness, 21st Century Skills, Teacher Development

Animal Sciences

Department Information

- **Department Head:**
  Guillermo Scaglia, Ph.D.
- **Graduate Coordinator:**
  Kendall Swanson, Ph.D.
- **Department Location:**
  100 Hultz Hall
- **Department Phone:**
  (701) 231-7641
- **Department Web Site:**
  www.ag.ndsu.edu/ansc/ (http://www.ag.ndsu.edu/ansc/)
- **Application Deadline:**
  Applications are accepted for fall, spring and summer semester admits.
- **Credential Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

The Department of Animal Sciences offers graduate study leading to Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees. Advanced work may involve specialized training in the following areas: animal breeding, animal nutrition, animal genetics, animal health and stewardship, physiology of reproduction, meat and muscle science, and nutritional physiology.

Student research and academic programs are tailored to individual student needs and interests. Interdisciplinary approaches to Animal Sciences programs are fostered.

Application Process

Contact Potential Advisor

Prospective students are ***strongly encouraged*** to contact potential advisors in the department before formal application to the Graduate School so that the student can determine if the faculty member is currently accepting new students and to determine if the faculty member(s) research program is an appropriate fit for both the student and faculty member(s). Official approval of admission does not occur until approval through the Graduate School and agreement of a faculty member(s) to accept the student as an advisee in their research program.

Application Through Graduate School

Applications are submitted to the Graduate School through the Application Website (https://www.ndsu.edu/gradschool/apply/). Requirements for admission to
the graduate school for domestic and international students are also listed on this website. Our department does not require students to have taken the GRE exam. Information on requirements for International Applicants (https://www.ndsu.edu/gradschool/apply/international/) including English Proficiency are also provided through the Graduate School. Once the Graduate School has received a complete application, it is forwarded to the department for review. Each graduate program makes its own recommendation, but the final admission decision is the responsibility of the Dean of the College of Graduate and Interdisciplinary Studies.

Financial Support

Assistantships

Graduate research assistantships are available on a competitive basis. Graduate assistants are typically full-time graduate students who participate in teaching, research, Extension, and/or other departmental activities in exchange for financial support at North Dakota State University. Graduate assistantships are typically considered ½ time in the Department of Animal Sciences, which equates to approximately 20 hours of work per week. Weekly duties are coordinated in consultation with the student's graduate advisor. Most research assistantships in the Department of Animal Sciences are supported from grant funds obtained by individual faculty members. Student tuition waivers (coordinated through the College of Agriculture, Food Science, and Natural Resources) are also currently granted for students receiving an assistantship. Students are still required to pay student fees. Students are referred to the Graduate Assistantship Policies (https://catalog.ndsu.edu/graduate/graduate-school-policies/graduate-assistantship-policy/) in the Graduate Catalog for further information. The department has a limited number of full- and half-time fellowships to support graduate students with priority to incoming students from North Dakota. The faculty member for which the student is, or will be, working with is responsible for submitting fellowship applications to the departmental Graduate Coordinator for review by the departmental graduate committee when calls for applications are made.

M.S. Requirements

Typically, students in the M.S. program in Animal Sciences are in the thesis-based program (Plan A). Refer to the Graduate School Catalog Policy (https://catalog.ndsu.edu/graduate/policies/) for further information on the Master's Paper/Comprehensive Study program (Plan B).

The minimum requirements for the M.S. degree are:

- Minimum 30 credits total
- 16 of the 30 must be didactic credits
  - 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.
  - 600 number courses are stacked undergraduate/graduate course, and 700 and 800 number courses are MS and PhD level 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.
- 6-10 credits of ANSC 798 (Master's Thesis)
- Departmental required courses
  - ANSC 790 (Graduate Seminar): 2 credits
  - ANSC 793 (Graduate Teaching Experience): 2 credits typically over 2 semesters of 1 credit each; required for students on assistantship)
- Suggested courses
  - 1 or more ANSC graduate courses
  - 6 credits of statistical courses in STAT, PLSC, or ANSC
  - 3-6 credits of biochemistry
  - 1 writing course in ANSC, ENGL, ENT, or from another class subject/department
  - Students are also encouraged to take courses from other disciplines depending on their research program and interest

Ph.D. Requirements

Typically, students enrolled in the Ph.D. program will have successfully completed a M.S. degree in Animal Sciences or related field from NDSU or another reputable University. If enrolling in the Ph.D. program directly from a B.S. program, please refer to the Graduate School Catalog (https://catalog.ndsu.edu/graduate/policies/).

The minimum requirements for the Ph.D. degree are:

- Minimum of 90 graduate credits total
  - Thirty credits from a previously earned M.S. degree may be approved to fulfill 30 of the 90 doctoral program credits required. The previous M.S. degree must be

in the same or a meaningfully related discipline.
    - Up to 15 transfer credits from another doctoral program in the same or a meaningfully related discipline from an accredited doctoral institution may be allowed in individual cases.
    - Minimum of 45 credits total completed at NDSU
- 15 credits must be 700-800 level didactic courses
    - 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.
    - 600 number courses are stacked undergraduate/graduate course, and 700 and 800 number courses are M.S. and Ph.D. level 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.
- Departmental required courses
    - ANSC 790 (Graduate Seminar): 2 credits
    - ANSC 793 or 892 (Graduate Teaching Experience): 3 credits typically over 3 semesters of 1 credit each; required for students on assistantship)
- Suggested courses
    - Dependent on academic background and interests
    - Could include courses in ANSC, BIOC, STAT, BIOL, ENGL, etc.

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:Working with swine as a biomedical model for humans to study the impact of food and food combinations on obesity-related metabolic disorders

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

Erin Beyer, Ph.D.
Kansas State University, 2023
Research Interests: Post-harvest effects on eating quality of meat

Chris Byrd, Ph.D.
Purdue University, 2018
Research Interests: Applied ethology, stress physiology, animal welfare science, swine production

Kasey Maddock Carlin, Ph.D.
Iowa State University, 2005
Research Interests: Meat Science with emphasis on physiological and biochemical changes in muscle postmortem on meat quality

Joel S. Caton, Ph.D.
New Mexico State University, 1987
Research Interests: Ruminant nutrition with emphasis on nutrition and reproduction interactions, Forage utilization, digestive physiology and selenium metabolism

Carl Dahlen, Ph.D.
University of Minnesota, 2009
Research Interests: Beef cattle production

Carolyn Hammer, DVM, Ph.D.
Iowa State University, 2003
Research Interests: Equine preventative medicine, growth and development, immunology

Lauren Hanna, Ph.D.
Texas A & M University, 2013
Research Interests: Animal Genetics; Genomics

Travis Hoffman, Ph.D.
Colorado State University, 2015

Research Interest: Sheep production, lamb quality, sheep and goat value, direct meat marketing

Miranda Meehan, Ph.D.
North Dakota State University, 2012
Research Interests: Riparian ecology and management, livestock and wildlife Interactions, Impacts of energy development on livestock production

Lawrence P. Reynolds, Ph.D.
Iowa State University, 1983
Research Interests: Maternal and placental physiology during pregnancy in livestock including cellular and molecular aspects

Guillermo Scaglia, Ph.D.
Texas A&M University, 2002
Research Interests: Ruminant nutrition, plant-animal interface, management of grazing ecosystems, precision livestock farming, sustainability of livestock production systems

Gerald Stokka, DVM, M.S.
Iowa State University, 1982
Research Interests: Immunology; preventive medicine; animal stewardship and well-being

Kendall Swanson, Ph.D.
University of Kentucky, 2001
Research Interests: Ruminant nutrition, energy and nitrogen metabolism, pancreatic function, digestion, and alternative feed ingredients for finishing cattle and over-wintering cows

In addition to the above listed faculty, there are numerous adjunct faculty members who participate in the graduate program.

Anthropology

Department Information

- **Department Chair:**
  Christina Weber, Ph.D.
- **Graduate Coordinator:**
  Kristen Fellows, Ph.D.
- **Department Location:**
  Minard 428
- **Department Phone:**
  (701) 231-8657
- **Department Email:**
  ndsu.anthropology@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/socanth (http://www.ndsu.edu/socanth/)
- **Application Deadline:**
  For full consideration, applications must be received by February 1 for fall semester.
- **Credential Offered:**
  M.A., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 100; IELTS 7; Duolingo 125

The Department of Sociology and Anthropology offers a Master of Science (M.S.) and Master of Arts (M.A). degree in Anthropology. The program centers on human cultural diversity past and present, and is based on the principle that graduate level education in Anthropology is a desirable preparation for a growing number of career orientations. 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.

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. Our graduates have gone on to pursue careers in cultural resource management, tribal historic preservation, university and college teaching, museum work, international studies administration, National Park Service archaeology, not-for-profit program event coordination management, 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 medical and psychological anthropology, cultural anthropology, historical archaeology, and Indigenous archaeology.

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.

Three program options are available for students. In the thesis option (Plan A), students work on a research-based thesis. Students typically test theoretical assumptions using primary or secondary data. The comprehensive study option (Plan B) is designed for students who wish to pursue an applied topic of study. Students electing this option are required to complete a comprehensive study paper. The culminating experience option (Plan C) requires a final examination in place of a thesis or paper.

Students in the Anthropology graduate program benefit from a favorable faculty-to-student ratio.

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 admission application, official transcripts, and three letters of reference must be received by the Graduate College no later than February 1.

In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

Students will write a master's thesis (Plan A), complete a comprehensive study paper (Plan B), or pursue a culminating experience exam (Plan C). The student's schedule of courses must be approved by the faculty adviser. One theory and one methods-oriented course is required for all plans.

Students in the master's thesis option (Plan A) complete a minimum of 30 credits, including at least 16 didactic credits, and a master's thesis. Students in the comprehensive study option (Plan B) complete a minimum of 30 credits, including at least 21 didactic credits, and a master's paper. Students in the culminating experience option (Plan C) complete a minimum of 33 credits, including at least 21 didactic credits, and an exam. An oral defense of the thesis, research paper, or exam is required.

Thesis (Plan A) Option

Code	Title	Credits
Didactic courses (601-689, 691; 700-789, 791; 800-889, 891), including:		**16**
	Theory-oriented Anthropology course (e.g. ANTH 680 Development of Anthropological Theory)	
	Methods-oriented Anthropology course (e.g. ANTH 681 Qualitative Methods in Anthropology)	
Thesis credits (ANTH 798)		**6**
Additional coursework		**8**
Total credits:		**30**

Comprehensive Study (Plan B) Option

Code	Title	Credits
Didactic Courses (601-689, 691; 700-789, 791; 800-889, 891), including:		**21**
	Theory-oriented Anthropology course (e.g. ANTH 680 Development of Anthropological Theory)	
	Methods-oriented Anthropology course (e.g. ANTH 681 Qualitative Methods in Anthropology)	
Research paper credits (ANTH 797)		**4**
Additional coursework		**5**
Total Credits		**30**

Culminating Experience Exam (Plan C) Option

Code	Title	Credits
Didactic Courses (601-689, 691; 700-789, 791; 800-889, 891), including:		**21**
	Theory-oriented Anthropology course (e.g. ANTH 680 Development of Anthropological Theory)	
	Methods-oriented Anthropology course (e.g. ANTH 681 Qualitative Methods in Anthropology)	
Exam preparation credits (ANTH 799)		**1-3**

Additional coursework	**9-11**
Total credits:	**33**

Additional coursework can include Field Experience (ANTH 695/795), Practicum (ANTH 794), and/or additional didactic courses in the student's area of study.

John L. Creese, Ph.D.
University of Toronto, 2011
Research Interests: Collaborative Indigenous Archaeology, Spatial Analysis, Household and Settlement Archaeology, Material Culture, Theory, North America and Great Lakes

Kristen R. Fellows, Ph.D.
University of Pennsylvania, 2013
Research Interests: Anthropological Archaeology, Historical Archaeology, Ethnohistory, African Diaspora, Archaeology of Plantations; Colonial Encounters; Globalization and Transnationalism; Feminist Archaeology, the Caribbean; North America

Ellen B. Rubinstein, Ph.D.
Yale University, 2012
Research Interests: Medical and Psychological Anthropology, Diagnosis, Disability, Care, Aging, Family, U.S. Primary Care, Cancer Survivorship, Japan

Applied Economics

Department Information

- **Interim Department Chair:**
  Cheryl Wachenheim
- **Department Location:**
  500 Barry Hall
- **Department Phone:**
  (701) 231-7441
- **Department Email:**
  ndsu.agribusiness@ndsu.edu
- **Department Web Site:**
  www.ag.ndsu.edu/agecon/ (http://www.ag.ndsu.edu/agecon/)
- **Application Deadline:**
  March 1
- **Credential Offered:**
  Ph.D.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL iBT 79, IELTS 6.5, Duolingo 105

The Doctor of Philosophy (Ph.D.) program in Applied Economics is designed to empower students as independent thinkers and solution-oriented researchers. Our outcome-based program equips students with the essential tools to conduct impactful research across diverse areas of applied economics. As students progress through the program, they will develop the analytical prowess and a holistic skill set needed to address empirical challenges through economic theory and rigorous research. The program offers 15 credits of core classes with the remaining 75 credits being earned through other credit-based academic activity that may or may not include didactic coursework.

Admission Requirements

The program admits new students for the Fall semester of each odd-numbered year. Applications must be submitted by March 1st prior to the Fall semester of intended enrollment. To be considered for admission, applicants must

- have earned a 150 score or above on the quantitative portion of the GRE
- have demonstrated mathematical competency in multivariate calculus, linear (matrix) algebra, and calculus based probability theory
- have completed a Bachelor of Science or Master of Science degree in Economics, Agricultural Economics, or a related discipline and have a cumulative GPA of 3.0 or above

Financial Assistance

Granting assistantships depends on academic performance, departmental needs, and availability of assistantships. To be considered for a Graduate Research Assistantship (GRA) or Graduate Teaching Assistantship (GTA) applicants must obtain a 155 or above on the quantitative portion of the GRE. Assistantships do not begin until the first semester of full graduate standing when courses that apply for the Ph.D. degree are taken.

Students with an assistantship perform research or teaching duties in the department and are paid a monthly stipend. Most assistantships are full-time (20 hours per week) or half-time (10 hours per week). In addition to the stipend, students may receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

All students pursuing a Ph.D. in Applied Economics must complete all core courses in microeconomics, macroeconomics, and econometrics. Students select elective courses (with approval of the adviser and supervisory committee) to fulfill the remaining Graduate College credit requirements. To progress to the second year of the doctoral program, students must successfully complete qualifying exams in both microeconomics and econometrics.

The student and major adviser prepare a plan of study by the end of the first year in residence that contains no less than 90 credits as required by the Graduate College. Of these credits, 15 are core courses and will include:

1. six credits in microeconomic theory: New courses ECON 841 and ECON 842
2. three credits in macroeconomic theory: existing course AGEC 743
3. six credits in econometrics. New courses ECON 810 and ECON 811

The remaining credits are tailored to the student and can be earned through any credit-based academic activity. Additionally, mastery of at least one pre-approved field of applied economics will be demonstrated by:

1. capacity to synthesize important economic literature in the field;
2. demonstrated capacity to master key methods in the field; and
3. capacity to produce original research in the field.

It is required that students have demonstrated mathematical competency in multivariate calculus, linear (matrix) algebra, and calculus based probability theory. These can be demonstrated by completion of the following courses at NDSU (or their equivalent at another university): Math 259 or Math 265, Math 129, and Stat 367. Alternatively, a student can demonstrate the required mathematical competency by completing an approved course in Mathematical Economics (or Mathematics for Economics) equivalent to ECON 439/639 at NDSU.

Kwame Addey, Ph.D.
North Dakota State University, 2023
Research Interests: International Trade, and Financial Markets (Statistical Arbitrage)

Jon Biermacher, Ph.D.
Oklahoma State University, 2005
Research Interests: Economics of Livestock Production, Crop Production and Marketing Systems, Technology and Biotechnology Adoption, and Rural and Community Economic Development

David Bullock, Ph.D.
Iowa State University, 1989
Research Interests: Futures and Options Markets, Over-The-Counter Derivatives, Trading, Risk Management, Agrifinance, Monte Carlo Simulation, and Big Data Applications in Agriculture

James Caton, Ph.D.
George Mason University, 2016
Research Interests: Entrepreneurship Agent-based Computational Economics, Market Process Theory, Monetary Economics

Erik Hanson, Ph.D.
University of Minnesota, 2016
Research Interests: Agricultural Finance, Farm Management, Marketing and Production Economics

Ron Haugen, M.S.
North Dakota State University, 1989
Research Interests: Farm Management

Robert Hearne, Ph.D.
University of Minnesota, 1995
Research Interests: Natural Resource and Environmental Economics

Jeremy Jackson, Ph.D.
Washington University in St. Louis, 2008
Research Interests: Microeconomics, Political Economy, Public Finance

Thomas Krumel, Ph.D.
University of Connecticut, 2020
Research Interests: Rural Development, Labor Demand, and Labor Market Skills Mismatch

Siew Hoon Lim, Ph.D.
University of Georgia, 2005
Research Interests: Production Economics, Transportation, Industrial Organization

Raymond March, Ph.D.
Texas Tech University, 2017
Research Interests: Public and Private Provision and Governance of Health Care in the United States

Dragan Miljkovic, Ph.D.
University of Illinois, 1996
Research Interests: Agricultural Prices, International Trade, Agricultural and Food Marketing and Policy

William Nganje, Ph.D.
University of Illiniois at Urbana-Champaign, 1999
Research Interests: Agricultural Finance, Food Safety Economics

Frayne Olson, Ph.D.
University of Missouri, 2007
Research Interests: Crop Marketing Strategies, Crop Supply Chain Management, Agricultural Contracting, Agricultural Risk Management

Bryon Parman, Ph.D.
Kansas State University, 2013
Research Interests: Whole Farm and Agribusiness Financial Structure, Risk Management, Land Values and Rents, and Farm Financial Trends

Timothy Petry, M.S.
North Dakota State University, 1973
Research interests: Livestock Marketing

Veeshan Rayamajhee, Ph.D.
University of New Mexico, 2019
Research Interests: Individual and Collective Responses to Covariate Shocks

David Ripplinger, Ph.D.
North Dakota State University, 2011
Research Interests: Production Economics and Marketing

David Roberts, Ph.D.
Oklahoma State University, 2009
Research Interests: Natural Resource and Environmental Economics, Econometrics, Production Agriculture

Anupa Sharma, Ph.D.
Virginia Polytechnic Institute and State University, 2016
Research Interests: Economics, Agriculture Business and Management

Sandro Steinbach, Dr. Sc.
ETH Zurich, Swiss Federal Institute of Technology, 2018
Research Interests: International Trade and Agricultural Policy

Cheryl J. Wachenheim, Ph.D.
Michigan State University, 1994
Research Interests: Agribusiness

William W. Wilson, Ph.D.
University of Manitoba, 1980
Research Interests: Commodity Marketing, Agribusiness, Industrial Organization

Architecture

Department Information

- **Department Chair:**
  Susan Kliman, Ph.D.
- **Graduate Coordinator:**
  Cindy Urness, M.Arch.
- **Department Location:**
  Renaissance Hall
- **Department Phone:**
  (701) 231-6151
- **Department Web Site:**
  www.ndsu.edu/sodaa/ (http://www.ndsu.edu/sodaa/)
- **Application Deadline:**
  February 1 for fall semester, portfolio required
- **Credential Offered:**
  Master of Architecture (M.Arch.)
- **English Proficiency Requirements:**
  TOEFL ibT 80; IELTS 6.5, Duolingo 105

North Dakota State University (NDSU) offers a 5-year National Architectural Accrediting Board (NAAB) accredited, first-professional Master of Architecture (M.Arch.) degree program housed primarily in a beautifully-restored historic industrial building in downtown Fargo, which has emerged as an exciting, student-oriented urban district. Most students entering the graduate program in architecture come directly from the NDSU pre-professional Bachelor of Science in Architecture program. The curriculum includes field trips to cities across the country and is supported by a professionally-staffed wood shop, digital media labs, and laser cutters and 3D printing for model-making. Both traditional and digital media are emphasized. An optional semester abroad, plus foreign study tours during summers are offered.

In the United States, most registration boards require a degree from an accredited professional degree program as a prerequisite for licensure.

The 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. The next accreditation visit will be in 2026.

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.

Admission Requirements

- Students currently enrolled in the 4-year pre-professional degree at NDSU may apply to the Master of Architecture program. Transfer students with pre-professional or professional degrees in architecture from another school may be considered for admission to years 4 and 5 in the program, based on test scores, GPA, and portfolio review. Transfer students should contact the department directly before application to the Graduate School.
- Candidates must have earned a cumulative grade point average of 3.0 to be considered for full graduate standing

Curriculum

Click here for the latest information on the Curriculum. (https://www.ndsu.edu/architecture/academics/master_of_architecture/)

Click here for course descriptions. (p. 1047)

Bakr Mourad Aly Ahmed, Ph.D.
Virginia Tech, 2002
Creative/Research Interests: Beach Resort Design, Sustainable Design Modeling, Eco-Tourism Development, Building Capacity Measures, Advanced Environmental Planning

Mark Barnhouse, M.Arch.
Pratt Institute, 1988
Creative/Research Interests: Water Resources and the Built Environment, and the Graphic Interpretation of Parametric Data about the Built Environment

David Bertolini, Ph.D.
Temple University, 2007
Creative/Research Interests: Architecture and Film Theory, Ideology and Aesthetics

David A. Crutchfield, M.Arch., AIA
University of Texas at Austin, 2004
Creative/Research Interests: Theoretical Inquiry into Architecture as the Interrelation of Nature, Culture, and Aesthetics; Innovation, Analysis, and Critical Evaluation of Eco-social Design; Sustainable Design in Professional Practice

Heather L. Fischer, MDS-HP
Boston Architectural College, 2014
Creative/Research Interests: Architectural Drawing; Environmental Design/Planning; Historic Preservation; Public Policies; Rural/Cultural Landscapes, and Planning

Paul H. Gleye, Ph.D.
University of California Los Angeles, 1983
Creative/Research Interests: Place-making, Historic Preservation, City Centers

Charlott Greub, M.Arch.
Kunstakademie Düsseldorf, 1992
Creative/Research Interests: Art, Urban Planning, and Design

Susan Kliman, Ph.D.
University of Arizona, 2015
Creative/Research Interests: Desert Architecture, Energy Modeling, Sustainability

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

Ronald H.L.M. Ramsay, M.Arch.
University of Texas at Austin, 1992
Creative/Research Interests: Architectural History, Historic Preservation, the Progressive Era, Planning History, Professionalization, Faith and Form

Regin Schwaen, M.A.A.
City Building, Arkitektskolen i Aarhus, 1992
Creative/Research Interests: Urban Buildings, Conceptual Models, Minimal Concrete Structures, Visual Communication

Cindy Urness, M.Arch.
Pratt Institute, 1988
Creative/Research Interests: Building Technology, Urban Design, Utopian Cities, Sustainable Design, Universal Design, Student Success

Stephen Wischer, M.Arch., MFA
University of Calgary, 2004
Creative/Research Interests: History/Theory, Existential Philosophy, Interdisciplinary Relationships, Art, Embodied Artifacts, Process, Experience and Poetics

Athletic Training

Department Information

- **Department Head:**
  Yeong Rhee, Ph.D.
- **Program Coordinator:**
  Matthew Drescher, Ph.D.
- **Department Location:**
  Bentson Bunker Fieldhouse
- **Department Phone:**
  (701) 231-7474
- **Department Web Site:**
  www.ndsu.edu/hnes/graduate_programs/athletic_training_professional/ (http://www.ndsu.edu/hnes/graduate_programs/athletic_training_professional/)
- **Application Deadline:**

Application review beings December 1 and continues until spots are filled.

- **Credential Offered:**
  M.A.Trg.
- **English Proficiency Requirements:**
  TOEFL iBT 100; IELTS 7; PTE Academic 68; Duolingo 125

The Master of Athletic Training (M.A.Trg.) is a professional program accredited by the Commission on Accreditation of Athletic Training Education (CAATE). The M.A.Trg. program prepares students to take the Board of Certification, Inc. (BOC) examination and earn the 'ATC' credential. Didactic courses and clinical experience courses focus on prevention, assessment, treatment and rehabilitation of injuries resulting from physical activity. This is a five-semester program starting in the summer term.

Option 1: Five-Year Program. This unique option allows the student to complete a Bachelor of Science in Exercise Science and Master of Athletic Training (M.A.Trg) degree in five years.

- During *years 1-3* students follow the North Dakota State University (NDSU) Exercise Science guidelines and curriculum**.
- Students apply to the M.A.Trg. program through the Athletic Training Centralized Application System (ATCAS) during the third year (typically Junior standing).
- Accepted students begin the M.A.Trg. program in the summer.
- During *year 4* students complete both Exercise Science ***and*** M.A.Trg. courses. The Exercise Science degree is awarded in August.
- During *year 5* students complete M.A.Trg. courses. Upon successful completion of all program and Graduate College requirements, the M.A.Trg. degree is awarded in May.

** Transfer students and students who change majors must follow the Exercise Science policies and curriculum. This may extend the time line for program completion.

Option 2: Two-Year Program. Students who have a conferred Bachelor's degree in a related field will follow Option 2.

- Students apply to the M.A.Trg. program through the Athletic Training Centralized Application System (ATCAS) .
- Accepted students begin the program in the summer.
- Years 1 and 2 students follow the M.A.Trg. Plan of Study for Option 2
- Upon success complete of all program and Graduate College requirements, the M.A.Trg. degree is awarded in May.

Requirements for 2023-24 Admission

Program Website: ndsu.edu/hnes/graduate_programs/athletic_training_professional/ (https://www.ndsu.edu/hnes/graduate_programs/athletic_training_professional/)

1. Overall GPA of 3.0 at the time of application (3.0 GPA or higher maintained to start of program)
2. The following courses must be completed with a letter grade of "C" or better earned and documented on official transcripts prior to the start of the program in Summer 2023.
   - Human Anatomy and Lab 1 semester
   - Human Physiology and Lab 1 semester
   - General Physics 1 semester
   - General Chemistry 1 semester
   - Biology 1 semester
   - Biomechanics and/or Kinesiology 1 semester
   - Medical Terminology 1 semester
   - Nutrition 1 semester
   - Psychology 1 semester
3. Statement of Purpose: Please include the following information in your statement:
   a. Reasons why you are pursuing graduate studies at NDSU
   b. Explain your interest in pursuing a career in Athletic Training

   c. Background preparation for Athletic Training
   d. Relevant skills and experiences you have acquired
4. Writing sample: Pitch the profession of athletic training as if you were speaking to a new student in the profession. Maximum word count: 300 words.
5. Two letters of recommendation – at least one letter must be from an instructor/professor. They must testify to integrity (i.e. professionalism, communication skills, work ethic) of the student.
6. Documentation of a minimum of 20 hours of observation completed under the direct supervision of a BOC ATC® in an athletic training room setting. Twenty hours must be completed within one (1) calendar year of application. Form can be found on M.A.Trg. website. Submit signed form under supplemental materials.
7. Documentation of current CPR Training in one of the following:
   a. American Heart Association: BLS Healthcare Provider/BLS Provide
   b. American Red Cross: CPR/AED for the Professional Rescuer
   c. American Red Cross: Basic Life Support of Healthcare Providers

   Submit copy of certificate under supplemental materials.
8. International students must meet the following English Language Test score requirements for HNES Graduate Programs:

   TOEFL (ibt): 100 IELTS: 7 Duolingo: 125 Academic PTE: 68

Application Process

1. Apply online through ATCAS: https://atcas.liaisoncas.com/applicant-ux/#/login.
2. After creating your account, select the NDSU M.A.Trg. program.
3. Follow steps to pay the $35 NDSU application fee.

Application submission does not constitute acceptance into the program nor is acceptance guaranteed simply upon completion of requirements. Only completed applications will be reviewed. Admission requirements are weighted. Overall GPA and interview performance carry the major percentage of the weighting process. Exceptions to the requirements can be made on recommendation by the M.A.Trg. Application Committee.

Admission Acceptance/Denial into the M.A.Trg.:

The M.A.Trg. application process is a competitive process. A committee reviews completed graduate school applications and selects applicants to interview. The committee will set up a time with the student to complete the interview process (web-based or in person). Students will be notified by the NDSU Graduate School regarding formal M.A.Trg. program status. All NDSU Graduate School Policies will be followed accordingly.

Code	Title	Credits
HNES 720	Advanced Emergency Care	3
HNES 780	Athletic Training Techniques	3
HNES 770	Evidence Based Research and Practice	2
HNES 781	Orthopedic Assessment I	4
HNES 778	Athletic Training Administration and Professional Development	3
HNES 782	Orthopedic Assessment II	5
HNES 774	Therapeutic Exercise	3
HNES 775	Therapeutic Modalities	3
HNES 776	Non-Orthopedic Assessment	3
HNES 772	Prevention and Health Promotion in Athletic Training	2
HNES 773	Athletic Training Capstone	2
HNES 794	Practicum/Internship	12
Total Credits		**45**

Shannon David, Ph.D., ATC
Ohio University, 2013
Contemporary Expertise: Patient-Clinician Relationship, Research Methods and Design, Professional Issue

Matthew Drescher, PhD, DAT, LAT, ATC
Indiana State University, 2023
Contemporary Expertise: Emergency Medicine, Ethics Education, Quality Improvement, Advanced Manual Therapy

Joshua Wooldridge PhD, LAT, ATC, CSCS
University of Nevada, Las Vegas, 2023

Contemporary Expertise: Prevention and Wellness, Rehabilitation, Performance Enhancement

Big Data Applied Statistics Analysis

Department Information

- **Department Location:**
  221 Morrill Hall
- **Department Phone:**
  (701) 231-7177
- **Department Email:**
  ndsu.stats@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/statistics/ (http://www.ndsu.edu/statistics/)
- **Credential Offered:**
  Certificate

In this era of big data, analytics professionals are in demand. Graduate students and working professionals will develop the skills that can be applied to various tech-related careers, such as data scientist, statistical programmer, business analytics, computer programmer, and data engineer. As a student in this program, you will gain expertise in applied statistics, practical machine learning, data manipulation, data visualization, database system, and parallel computing. You can expect to learn how to use programming languages such as R, SQL, or Python.

Curriculum

Certificate curriculum is offered online in the summer semester.

Code	Title	Credits
STAT 712	Applied Statistical Machine Learning	3
STAT 711	Basic Computational Statistics using R	3
STAT 713	Introduction to Data Science	3
STAT 714	Statistical Big Data Visualization	3
Total Credits		**12**

Biochemistry

Department Information

- **Department Chair:**
  Gregory Cook, Ph.D.
- **Graduate Admissions Director:**
  Uwe Burghaus, Ph.D.
- **Department Location:**
  Ladd Hall
- **Department Phone:**
  (701) 231-8694
- **Department Web Site:**
  www.ndsu.edu/chemistry (http://www.ndsu.edu/chemistry/)
- **Application Deadline:**
  April 15 for fall, October 31 for spring. Spring admissions depend on the availability of fellowships and faculty interests. If there are no spring openings, spring applications are automatically considered for the subsequent fall semester.
- **Credential Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE required for applicants who have not earned a degree in the U.S. GRE (general and subject recommended for domestic applicants, but not required)
- **English Proficiency Requirements:**
  RA - TOEFL 71, IELTS 6, Duolingo 105; TA Grader - TOEFL 79, IELTS 6.5, Duolingo 110; TA Instructor - TOEFL 81, IELTS 7, Duolingo 115

The Department of Chemistry and Biochemistry offers graduate study leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees. The department also participates in the interdisciplinary Ph.D. program in Cellular and Molecular Biology.

At the start of the first year of study, entering graduate students take entrance examinations in chemistry and biochemistry, as well as analytical, inorganic, organic, and physical chemistry. The graduate student progress committee uses these exams for advisory purposes in recommending course work during the first year. As a consequence, programs are individually tailored to the needs of each student.

The chemistry, biochemistry, and molecular biology of plant, animal, insect, and microbial systems are studied through advanced course work and research. Selection of the area of emphasis depends on the interests of the student. Typically, course work is completed in one to one-and-a-half years for M.S. candidates, and two years for Ph.D. candidates, leaving later years for full-time thesis research. The typical time to complete a graduate degree averages three years for the M.S. degree and approximately five years for the Ph.D.

Research Opportunities and Infrastructure

The Department of Chemistry and Biochemistry is a research intensive department with funded research programs spanning areas from materials to medicine. External research grants from the National Science Foundation, National Institutes of Health as well as many other public and private agencies support the graduate programs in the department.

All research and most teaching activities within the department occur within two centrally-located buildings. Sugihara Hall, a 100,000 square foot modern research facility, was opened in January 2022 to house the department offices, core instrument facilities and research labs. Research is also carried out in the Quinten Burdick building directly across the street from Sugihara Hall.

The department facilities house both teaching and research labs, glassblowing facilities, as well as stockroom and multiuser equipment for the campus. 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 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. The department also has modern 400 and 500 MHz Nuclear Magnetic Resonance (NMR) spectrometers for research with specialized capabilities for both small molecule analysis and protein NMR. The Materials Characterization Laboratory houses the departmental X-ray crystallography facilities and a brand new Analytical Ultracentrifuge. In addition to materials characterization, a Core Biology Facility that serves multiple users is housed within the department for performing bioassays, cell and tissue culture work, and molecular biology experiments. The facility has 96- and 384-well plate fluorimeters, culture changers, flow hoods, RT-PCR and FPLC protein purification instrumentation. All core facilities are staffed with highly trained technical staff for scientific consultation and training.

Prospective students are encouraged to visit the Department of Chemistry and Biochemistry website (http://www.ndsu.edu/chemistry/) for contact and more information.

The graduate programs in biochemistry are open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing to the program, the applicant must meet the Graduate School's admission requirements, have adequate preparation for the study of chemistry and biochemistry at the graduate level, and show potential to undertake advanced study and research as evidenced by academic performance and experience.

Financial Assistance

The student must first apply to the Graduate School and be accepted in full or conditional status before he/she is eligible for an assistantship in the Department of Chemistry and Biochemistry.

Graduate students in the Department of Chemistry and Biochemistry are supported by either teaching assistantships (TA) or research assistantships (RA). The standard stipend is $24,000 per year for both Research Assistants (RA) and Teaching Assistants (TA). In addition to the stipend, graduate assistants in good standing receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

Master of Science

The Master of Science program requires the completion 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 include at least 16 semester credits of didactic course work (https://catalog.ndsu.edu/graduate/graduate-school-policies/).

Code	Title	Credits
Required Courses		
CHEM 720	Introduction to Chemical Research	2
CHEM 790	Graduate Seminar (second year seminar)	1
or BIOC 790	Graduate Seminar	
UNIV 720		1

CHEM 790	Graduate Seminar (defense seminar)	1
or BIOC 790	Graduate Seminar	
Didactic Credits (601-689, 691; 700-789, 791; 800-889 and 891)		16 *
CHEM 798	Master's Thesis	6-10
or BIOC 798	Master's Thesis	
Total Credits Required		**30**
As part of total semester credits, the following departmental courses are recommended for students based on discipline:		
Analytical		
CHEM 632	Analytical Chemistry II	3
CHEM 730	Separations	2
CHEM 732	Advanced Survey of Analytical Chemistry	4
CHEM 736	Mass Spectrometry	2
Biochemistry and Molecular Biology		
BIOC 673	Methods of Biochemical Research	3
BIOC 674	Methods of Recombinant DNA Technology	3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
Inorganic		
CHEM 724	Chemical Applications of Group Theory	1
CHEM 725	Advanced Survey of Inorganic Chemistry	3
CHEM 727	Organometallic Chemistry	3
CHEM 728	Physical Methods for Chemical and Biomolecular Research	2
CHEM 744	Organic Spectroscopy	2
Organic		
CHEM 741	Physical Organic Chemistry I	4
CHEM 742	Physical Organic Chemistry II	2
CHEM 744	Organic Spectroscopy	2
CHEM 745	Organic Synthesis	4
Physical		
BIOC 665		
CHEM 760	Statistical Thermodynamics	4
CHEM 763	Kinetics	2
CHEM 764	Dynamics	2

*
A minimum of 10 must be from courses numbered 701-789; 791 or 800-889; 891

Each student chooses a thesis adviser within six months of beginning graduate school. As this is one of the most important decisions made in graduate school, students are strongly urged to visit multiple faculty members to discuss research opportunities. In addition, faculty seminars during the fall semester are designed to acquaint new students with the available research programs.

By the end of the first academic year, each student selects an advisory and examination committee, which consists of the thesis adviser, two other faculty members in the chemistry department, and one faculty member from a department outside the Department of Chemistry and Biochemistry.

Doctor of Philosophy

The Ph.D. program requires the completion of 90 graduate semester credits, post-baccalaureate, with an overall GPA of 3.0 or better. This total is comprised of both class work and research credit, but must include of at least 27 semester credits of didactic course work (https://catalog.ndsu.edu/graduate/graduate-school-policies/).

Candidates for the PhD degree are required to earn at least 90 semester credits, which can include credits for seminar and research. No fewer than 27 of these 90 semester credits shall be earned in courses carrying graduate credit (courses numbered 601 to 789), and of these 27 credits, a minimum of 20 must be from courses numbered 701 to 789. Of these 20 credits, the requirement is 8 total credits in at least two fields of study other than the major area, selected from:

- Analytical Chemistry
- Biochemistry & Molecular Biology
- Coatings and Polymeric Materials
- Inorganic Chemistry
- Materials & Nanotechnology
- Microbiology
- Organic Chemistry
- Physical Chemistry
- Other related area (e.g., Physics, Math, Pharmacy, Engineering, Zoology)

A student matriculating with a Master's Degree, including one earned at an international institution, must earn not fewer than 60 graduate credits at NDSU. Of these credits, not fewer than 15 credits must be NDSU courses numbered from 701 to 789. Courses numbered 601-689 may be used for the Plan of Study as long as they have not been taken in an undergraduate or previous graduate program. Approved courses are Department of C&B 625, 626, 627, 628 and 630.

Code	Title	Credits
Required Courses		
CHEM 720	Introduction to Chemical Research	
BIOC 790	Graduate Seminar (second year seminar)	
or CHEM 790	Graduate Seminar	
BIOC 790	Graduate Seminar (proposal seminar)	
or CHEM 790	Graduate Seminar	
BIOC 790	Graduate Seminar (public presentation)	
or CHEM 790	Graduate Seminar	
BIOC 790	Graduate Seminar (defense seminar)	
or CHEM 790	Graduate Seminar	
UNIV 720		
As part of total semester credits, the following departmental courses are required for students based on program:		
CHEM 725	Advanced Survey of Inorganic Chemistry	
BIOC 673	Methods of Biochemical Research	
BIOC 674	Methods of Recombinant DNA Technology	
BIOC 701	Comprehensive Biochemistry I	
BIOC 702	Comprehensive Biochemistry II	
CHEM 732	Advanced Survey of Analytical Chemistry	
CHEM 741	Physical Organic Chemistry I	
CHEM 759	Advanced Survey of Physical Chemistry	
BIOC 899	Doctoral Dissertation	

Admission to candidacy for the Ph.D. degree is accomplished by satisfying three requirements: 1) satisfactory performance in course work with a minimum 3.0 grade-point average, 2) satisfactory performance on a written comprehensive examination, taken by the end of the fourth semester, and 3) satisfactory defense of an original research proposal on a topic approved by the student's supervisory 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 supervisory committee.

Christopher L. Colbert, Ph.D.
Purdue University, 2000
Postdoctoral, Howard Hughes Medical Institute, 2000-2004
Research Interests: Structural Biology and Metalloprotein Biochemistry

Stuart J. Haring, Ph.D.
University of Iowa, 2004
Postdoctoral, University of Iowa, 2004-2008
Research Interests: DNA Metabolism and Cell Cycle Regulation

Kenton R. Rodgers, Ph.D.
University of Iowa, 1988

Postdoctoral, Princeton University, 1989-1993
Research Area: Inorganic and Bioinorganic Chemistry

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

John Wilkinson, Ph.D.
Vanderbilt University, 2001
Postdoctoral, University of Michigan, 2001-2006
Research Interests: Metabolic Control of Cancer Progression

Zhongyu Yang, Ph.D.
University of Pittsburgh, 2010
Research Area: Bioanalytical chemistry; Biophysics; Electron Paramagnetic Resonance Spectroscopy

Biological Sciences

Department Information

- **Department Chair:**
  Julia H. Bowsher, Ph.D.
- **Graduate Coordinator:**
  Steve Travers, Ph.D.
- **Department Location:**
  201 Stevens Hall
- **Department Phone:**
  (701) 231-7087
- **Department Email:**
  ndsu.biological.sciences@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/biology/ (http://www.ndsu.edu/biology/)
- **Application Deadline:**
  Applications must be submitted by January 15 for full consideration for GTA or GRA positions.*
- **Credential Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

*Applicants will not be considered without a department faculty member who has agreed to serve as the major adviser. For e-mail addresses of faculty members and additional information about our programs, please visit our web site at http://www.ndsu.edu/biology/.

Program Description

The Department of Biological Sciences offers graduate study leading to Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees. Master of Science degrees are available in Biology and Environmental and Conservation Sciences.

Doctor of Philosophy degrees are available in Biological Sciences, Genomics, Cellular and Molecular Biology, Environmental and Conservation Sciences, and STEM Education. Advanced work may involve specialized training in the following areas: aquatic biology, behavior, biology education research, cell biology, comparative biochemistry and physiology, cancer biology, conservation biology, ecology, endocrinology, developmental biology, evolution, fisheries biology, molecular biology, plant biology, population biology, prairie pothole ecology, evolutionary ecology and wildlife biology.

Student research and academic programs are tailored to individual needs and interests. Interdisciplinary approaches to biological problems are encouraged.

Research Facilities and Equipment

The Department of Biological Sciences occupies approximately 20,000 square feet of floor space in Stevens Hall for research. The NDSU Library has extensive holdings of journals, monographs, books, and other reference materials covering various fields in biology. The library offers full access to online catalogs and databases.

Faculty in the department have research programs ranging from molecular biology to ecosystem ecology and work with a wide variety of organisms across multiple levels of organization, from cellular mechanisms to ecosystem function. Modern equipment is available for conducting research in cell and molecular biology and field ecology and behavior. The department has access to a vascular plant herbarium with 240,000 specimens emphasizing Northern Great Plains flora, a lichen herbarium consisting of about 15,000 specimens with a worldwide representation of taxa, and a vertebrate collection with approximately 10,000 specimens.

The department offers access to a range of equipment and facilities necessary for laboratory research, including greenhouses, animal rooms, growth chambers, tissue culture facilities, ultracentrifuges, spectrophotometers, electrophoresis, light microscopes, gas chromatography, GC-mass spectrometry, and high performance liquid chromatography. Facilities are available for protein and DNA sequencing, oligonucleotide synthesis, interactive laser cytometry, scanning transmission and electron microscopy, and confocal microscopy.

The graduate programs in the Department of Biological Sciences are open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full status to the program, the applicant must meet all Graduate School admission requirements.

Applications should be submitted directly to the Graduate School. For full consideration for GTA or GRA positions, applications must be submitted by January 15. Applicants will not be considered without a department faculty member who has agreed to serve as the major adviser. Correspondence with one or more departmental faculty members before and during the application process is essential. For email addresses for faculty members and for additional information about our programs, please visit our website at www.ndsu.edu/biology/ (https://www.ndsu.edu/biology/).

Financial Assistance

A student must first be accepted by the Graduate College before consideration for financial assistance. Graduate research assistantships (GRA) and graduate teaching assistantships (GTA) are available. Applicants are considered based on scholarship, potential to undertake advanced study and research, as well as financial need.

In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

In addition to research and teaching assistantships, there are other types of financial support. A limited number of fellowships are available through the Graduate College. Outstanding scholarship and financial need are primary considerations for these fellowships. Scholarships in specific areas are also available through the Department of Biological Sciences. These are generally supplemental and do not include tuition waivers. Students are considered for these awards after enrollment, with primary considerations being scholastic performance and research at NDSU.

Students must select a major adviser prior to their arrival for graduate studies.

The M.S. 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 M.S. degree may be earned by either of two options. The Plan A: Thesis Option emphasizes completion of a research project. The Plan B: Comprehensive Study Option requires more course work, and instead of conducting research and presenting a thesis, the candidate presents a paper or papers approved by the adviser to the examining committee, demonstrating ability for scholarly study and written expression. Candidates under both options must present a seminar on the thesis research or comprehensive study and must pass an oral examination.

Code	Title	Credits
Master of Science (M.S.)		**30**
Basic Research Principles		
BIOL 790	Graduate Seminar	
UNIV 720	(or equivalent as approved by committee)	
BIOL 842	Quantitative Biology (or equivalent as approved by committee)	
Biological Content Courses to be approved by the advisory committee.		
BIOL 798	Master's Thesis	

The Ph.D. program generally requires a minimum of 36 months of full-time study, during which an overall GPA of 3.0 or better must be maintained. Candidates for the Ph.D. are required to take a preliminary written and oral examination directed to academic subject matter and an oral final examination of the dissertation.

Code	Title	Credits
Ph.D. Program		90
BIOL 790	Graduate Seminar	
BIOL 842	Quantitative Biology (or equivalent as approved by committee)	
BIOL 884	Biological Research Principles	
Biological Content Courses to be approved by the advisory committee		

UNIV 720	(or equivalent as approved by committee)
ZOO 899	Doctoral Dissertation

Laura Aldrich-Wolfe, Ph.D.
Cornell University, 2006
Research Interests: Community Ecology, Mycorrhyza and Plant-fungal Interactions

Julia H. Bowsher, Ph.D.
Duke University, 2007
Research Interests: Evolutionary and Developmental Biology of Insects

Ned A. Dochtermann, Ph.D.
University of Nevada, 2009
Research Interests: Evolutionary and Behavioral Ecology

Erin H. Gillam, Ph.D.
University of Tennessee-Knoxville, 2007
Research Interests: Evolution and Behavioral Function of Communication Signals Using Bats as a Model

Kendra J. Greenlee, Ph.D.
Arizona State University, 2004
Research Interests: Comparative Physiology, Insect Respiration and Immunology

Timothy J. Greives, Ph.D.
Indiana University, 2009
Research Interests: Hormones and Behavior, Seasonality, Biological Rhythms, Reproductive Eco-physiology

Britt Heidinger, Ph.D.
Indiana University, 2007
Research Interests: Physiological Ecology, Senescence, Stress Physiology

Angela Hodgson, Ph.D.
University of Minnesota, 2010
Research Interests: Ecosystem Biology and Wildlife Conservation Biology

Jiha Kim, Ph.D.
University of Georgia, 2006
Research interests: Tumor Microenvironment

Jennifer L. Momsen, Ph.D.
Rutgers, 2007
Research Interests: Biology Education at the Undergraduate Level

Lisa M. Montplaisir, Ph.D.
University of Arizona, 2003
Research Interests: Science Education, Teaching and Learning, Curriculum Development

Marinus L. Otte, Ph.D.
Vrije Universiteit, 1991
Research Interests: Wetland Science, Biogeochemistry, Plant Ecophysiology

Katie M. Reindl, Ph.D.
North Dakota State University, 2006
Research Interests: Cancer Cell Biology, Identification and Validation of New Drug Targets

Sarah Signor, Ph.D.
University of California-Davis, 2013
Research interests: Insect Evolutionary Genomics

Matthew Smith, Ph.D.
University of Arkansas, 2012
Research Interests: Patterns of Phenotypic Variation in Natural Populations

Craig A. Stockwell, Ph.D.
University of Nevada, 1995

Research Interests: Evolutionary Ecology of Vertebrate Populations, Conservation Biology, Fisheries Biology

Steven E. Travers, Ph.D.
University of California-Santa Barbara, 1998
Research Interests: Plant Evolutionary Ecology

Emeritus

William J. Bleier, Ph.D.
Texas Tech University, 1975
Research Interests: Blackbirds, Animal Depredation, Avian Ecology

Malcolm G. Butler, Ph.D.
University of Michigan, 1980
Research Interests: Aquatic Ecology, Limnology, Fisheries, Water Quality, Wildlife Management

Gary K. Clambey, Ph.D.
Iowa State University, 1975
Research Interests: Ecology and Biogeography, Environmental Analysis and Planning, Structure Function Relations in Midwestern Ecosystems, Human Ecology

Theodore L. Esslinger, Ph.D.
Duke University, 1974
Research Interests: Lichenology; Taxonomy, Chemosystematics, and Floristics of Lichens; Emphasis on the Parmeliaceae and Physciaceae

James W. Grier, Ph.D.
Cornell University, 1975
Research Interests: Eagles and Other Birds of Prey, Herpetology, Aquatic Organisms, Fossils, Animal Population Dynamics, Habitat Ecology

Gary L. Nuechterlein, Ph.D.
University of Minnesota, 1980
Research Interests: Behavioral Ecology of Birds; Wildlife Ecology, Particularly of Nongame Species

Adjunct

Michael J. Anteau, Ph.D.
Louisiana State University, 2006

Mark E. Clark, Ph.D.
University of Tennessee, 1996

Ned H. Euliss, Jr., Ph.D.
Oregon State University, 1989

Mark A. Hanson, Ph.D.
North Dakota State University, 1990

Douglas H. Johnson, Ph.D.
North Dakota State University, 1986

George M. Linz, Ph.D.
North Dakota State University, 1982

Daniel C. McEwen, Ph.D.
North Dakota State University, 2008

David M. Mushet, Ph.D.
North Dakota State University, 2010

Wendy L. Reed, Ph.D.
Iowa State University, 2000

Marsha A. Sovada, Ph.D.
North Dakota State University, 1993

Steve K. Windels, Ph.D.

Michigan Technological University, 2008

Brian Wisenden, Ph.D.
University of Western Ontario, 1993

Biomedical Engineering

Department Information

- **Program Coordinator:**
  Long Jiang, Ph.D.
- **Email:**
  long.jiang@ndsu.edu
- **Department Location:**
  Dolve 111C
- **Department Phone:**
  (701) 231-8839
- **Department Web Site:**
  www.ndsu.edu/coe/bme (http://www.ndsu.edu/coe/bme/)
- **Application Deadline:**
  February 15 for fall semester; September 15 for spring semester. Applications received after the deadline will still be considered, but preference is given to those submitted by the deadline.
- **Credential Offered:**
  Ph.D., M.S., on campus and online
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6, Duolingo 105

The graduate-level (Master of Science (M.S.) and Doctor of Philosophy (Ph.D.)) programs in Biomedical Engineering (BME) are offered jointly by North Dakota State University's (NDSU) College of Engineering, University of North Dakota's (UND) School of Medicine and Health Sciences, and UND's College of Engineering and Mines.

The BME programs provide opportunities for technically qualified persons to attain specialized knowledge in an area of industry need, and to enhance career opportunities. The objective of the jointly sponsored, interdisciplinary graduate programs is to:

- Meet the needs of regional students interested in biomedical engineering.
- Attract women and under-represented minorities into a developing field.
- Educate and train students through courses and research focused on biomedical research and device development.
- Advance the biomedical knowledge base through collaborative research directed by faculty from UND's School of Medical and Health Sciences, College of Engineering and Mines, and NDSU's College of Engineering and other qualified researchers from the two universities.
- Through biomedical research and device development, develop intellectual property to generate company spin-offs, attract new companies, and subsequent economic development.

For more information: ndsu.edu/coe/bme/ (https://www.ndsu.edu/coe/future_students/biomedical_engineering/)

Ph.D.:

a) Bachelor of Science degree from an ABET accredited engineering program

- Students holding a B.S. degree in other disciplines may be admitted to Qualified Status with an obligation to acquire the necessary background undergraduate engineering knowledge. The exact requirements will be determined on a case-by-case basis

b) Minimum GPA is 3.0 (4.0 scale) is required. Conditional admittance may be obtained for GPA less than 3.0.

M.S.:

a) Bachelor of Science degree from an ABET accredited engineering program.

- Students holding a B.S. degree in other disciplines may be admitted to Qualified Status with an obligation to acquire the necessary background undergraduate engineering knowledge. The exact requirements will be determined on a case-by-case basis.

b) Minimum GPA is 3.0 (4.0 scale) is required. Conditional admittance may be obtained for GPA less than 3.0.

Financial Assistance

Research and/or teaching assistantships may be available to qualified students. Applicants are considered based on scholarship, potential to undertake advanced study and research, and financial need. The availability of research and teaching assistantships is contingent upon current funding levels. Applicants should communicate with potential faculty advisors for funding opportunities.

For more information: ndsu.edu/coe/bme/ (http://engineering.und.edu/bme/)

Code	Title	Credits
M.S. - Plan A Thesis Option		**30**
Anatomy & Physiology		3-6
BIOL 660	Animal Physiology (or EE 590 Advanced Electrical Engineering Problems - UND)	
BRG Related Courses		6-9
Graduate Preparation (e.g. Grant Writing)		0-3
BME 794	(Practicum (industrial, clinical, or research lab))	1-3
Electives (approved by advisor)		9 (max)
BME 790	Graduate Seminar (One credit per semester.)	3
BME 798	Master's Thesis	9

Code	Title	Credits
M.S. - Plan B Master's Paper Option		**30**
Anatomy & Physiology		6-9
BIOL 660	Animal Physiology (or EE 590 Advanced Electrical Engineering Problems - UND)	
BRG Related Courses		6-9
Graduate Preparation (e.g. Grant Writing)		3
BME 794	(Practicum (industrial, clinical, or research lab))	1-3
Electives (as approved by advisor)		15 max
BME 790	Graduate Seminar (one credit each semester)	3
BME 797	Master's Paper	2-4

Code	Title	Credits
Ph.D. (90 credits)		
Anatomy & Physiology		3-6
BIOL 660	Animal Physiology	3
BME 790	Graduate Seminar (One credit per semester)	3-6
or UND-ENGR 562 Seminar (1 credit), or UND-EE 570 Seminar (1 credit)		
BRG Related Courses		12-15
BME 899	Doctoral Dissertation	6-30
Graduate Preparation (e.g. Grant Writing; College Teaching Certificate)		3-6
Internship (industrial, clinical, or research lab):		3-6
Electives (approved by adviser)		36 (max)

For more information: ndsu.edu/coe/bme/ (https://www.ndsu.edu/coe/future_students/biomedical_engineering/)

Business Administration

Department Information

- **Program Director:**
  Linlin Chai, Ph.D.
- **Program Coordinator:**
  Elizabeth Worth, M.Ed.

- **Email:**
  elizabeth.worth@ndsu.edu
- **Department Location:**
  Barry Hall
- **Department Phone:**
  (701) 231-6038
- **Department Web Site:**
  www.ndsu.edu/mba (http://www.ndsu.edu/mba/)
- **Application Deadline:**
  Applications are reviewed on a rolling admission basis for the intended or next available term.
- **Credential Offered:**
  MBA
- **Test Requirement:**
  GMAT or GRE**
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

The Master of Business Administration (MBA) 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 provides a generalized core curriculum along with a variety of elective options in areas such as business analytics, digital marketing and innovation, and leadership and managerial skills.

NDSU business faculty use a variety of teaching methods: case studies, group and individual projects, field research, computer applications, guest lecturers, student presentations, and discussion. Class interaction provides rich opportunity to network with professionals from a wide range of industries and countries. The student is able to acquire and improve problem-solving, teamwork, and communication skills and apply these skills in business situations.

Program Delivery

The MBA program is offered in two delivery methods: 1) On Campus/Hybrid, and 2) Online.

- The On Campus/Hybrid MBA program is designated primarily for individuals with limited (less than five years of) professional work experience. Core courses are delivered in-person, with numerous elective options offered in a variety of delivery methods. Students in the on campus/hybrid program typically are enrolled full-time (9 or more credits per semester), although it is not required.
- The Online MBA program is designated solely for individuals with significant (five or more years of) post-baccalaureate professional work experience. Core courses are delivered in a synchronous online format in the evenings, with numerous elective options offered in both synchronous and asynchronous online formats. Students in the online program typically are enrolled part-time (8 or fewer credits per semester).

Financial Assistance

The College of Business offers financial assistance through a limited number of graduate assistantships and scholarships. Applicants must be admitted on a conditional or full-standing basis to be considered for either an assistantship or scholarship. In addition to a stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits. Awards are offered on a competitive, case-by-case basis. Graduate assistantships are not available to students enrolled in the online program.

GMAT/GRE**

Individuals seeking admission to the MBA program may request a waiver of the GMAT/GRE requirement if they meet one of the following requirements:

- The applicant has a cumulative post-secondary GPA of 3.5 or higher (on a 4.0 scale) from an accredited or otherwise recognized institution of higher education.
- The application has successfully completed two or more post-secondary degrees (bachelor's level or higher).
- The applicant holds a terminal degree (e.g., PhD, EdD, MD, JD, etc.).
- The applicant has substantial post-baccalaureate professional work experience (typically a minimum of five (5) years), including demonstrated leadership ability.

Appropriate documentation (i.e. official transcript(s), resume) is required to be uploaded to the application file. It does not, however, guarantee a waiver. Applicants requesting an exam waiver are reviewed on a case-by-case basis, and waiver approval is determined at the discretion of the MBA program coordinator and/or director.

Pharm.D./MBA Dual Degree Program

The School of Pharmacy and the College of Business offer a dual degree Pharm.D./MBA program that allows students to use eight (8) credits toward degree requirements for both programs.

ADMISSION

Students must have a completed bachelor's degree in order to enroll in graduate credits under MBA degree-seeking status.

- Students admitted to the Pharm.D. program via the Post-Baccalaureate Pathway may apply for admission to the MBA program at any time.
- Students admitted to the Pharm.D. program via the Traditional Pathway or Early Admission Pathway may apply for admission to the MBA program for any term after the one in which they earn their bachelor's degree (typically awarded after the P2 year).

CURRICULUM

The following courses/credits have been approved to be used toward both Pharm.D. and MBA degree requirements:

- PHRM 640 Public Health for Pharmacists (3 credits)
- PHRM 670 Pharmacy Practice Improvement and Project Management (2 credits)
- PHRM 675 Pharmacy Management (3 credits)

Dual degree students should register for the above three courses under their GRAD career (rather than their PROF career).

In order to earn the MBA degree, dual degree students who complete the three courses (eight credits) listed above must also complete 16 core MBA credits (eight 2-credit core courses: MBA 701-708) and six additional approved elective credits. Dual degree students can expect to earn the MBA degree within one year following completion of their Pharm.D. degree by averaging 10-12 credits per semester during that final year.

TUITION

Students enrolled in the MBA program will be charged business differential graduate tuition on all graduate-level courses in which they are enrolled (even non-business course). Graduate credits do not count toward the undergraduate or pharmacy tuition caps.

The total course requirements to complete the MBA degree will vary depending on the background of the student. An adequate background in the functional areas of business is necessary for all students.

Foundation course areas include accounting, economics, statistics, management, marketing, and finance. Based on previous course work, some or all of these courses may be waived.

Beyond the foundation course requirements, all students must complete 30 semester hours of graduate work. Graduate courses in the MBA program include the following eight required 2-credit core courses, along with 14 credits of approved electives.

Code	Title	Credits
MBA Core Courses (16 credits)		
MBA 701	Strategic Cost Management	2
MBA 702	Advanced Financial Management	2
MBA 703	Advanced Organizational Behavior	2
MBA 704	Supply Chain and Operations Management	2
MBA 705	Strategic Marketing Management	2
MBA 706	Managing Information Resources	2
MBA 707	Microeconomics for Managers	2
MBA 708	Advanced Strategic Management	2
MBA Elective Course Options (14 credits)		**14**
MBA 711	Advanced Investment Analysis	
MBA 712	Advanced Portfolio Management	
MBA 713	Financial Derivatives	
MBA 714	Financial Analysis and Valuation	
MBA 721	Creating and Marketing Innovations	
MBA 722	Marketing Analytics and Customer Intelligence	

MBA 723	Digital Marketing
MBA 724	Integrated Marketing Communications
MBA 731	Leading and Managing Teams
MBA 732	Managerial Leadership: Essential Competencies
MBA 733	Management Decision Making
MBA 734	Negotiations
MBA 751	Business Analytics Concepts
MBA 752	Business Analytics Strategy
MBA 753	Business Analytics Methods
Any 700-level or higher course offered by the College of Business may be accepted as an elective for the MBA program. Select 600-level courses (FIN 610, FIN 620, FIN 630, FIN 640, and MGMT 630) may also be accepted as electives for the MBA program, so long as the student has not already earned credit for a 400-level equivalent course.	
Total Credits	**30**

Business Analytics Graduate Certificate

Description

The Business Analytics Graduate Certificate equips working professionals with methodologies and analytical tools needed to analyze data available in modern organizations. Participants will learn to use advanced spreadsheet functionality, dashboard visualization tools, and report generators for descriptive analytics to understand and report on historical data. In addition, participants will use data mining and other advanced methodologies for predictive and prescriptive analytics to understand future trends.

Curriculum

The certificate requires 8 credits of study, comprised of the following four courses.

Code	Title	Credits
MBA 751	Business Analytics Concepts	2
MBA 752	Business Analytics Strategy	2
MBA 753	Business Analytics Methods	2
MBA 722	Marketing Analytics and Customer Intelligence	2

Leadership and Managerial Skills Graduate Certificate

Description

The Leadership and Managerial Skills Graduate Certificate is designed to help participants improve their skills relating to decision making, communicating, negotiating, working in teams, and leading. In addition to learning theoretical aspects of these areas, the courses in the certificate also provide opportunities for students to improve their “soft skills” relating to working with other people and organizations.

Curriculum

The certificate requires 8 credits of study. Students must take four of the following five courses.

Code	Title	Credits
Select four of the following courses:		
MBA 731	Leading and Managing Teams	
MBA 732	Managerial Leadership: Essential Competencies	
MBA 733	Management Decision Making	
MBA 734	Negotiations	
MBA 736	Managing Conflict in Organizations	
Total credits		**8**

Digital Marketing and Innovation Graduate Certificate

Description

The Digital Marketing and Innovation Graduate Certificate advances participants' knowledge and skill in areas such as marketing strategy, communication, and customer intelligence. Students learn about such topics as new product development, strategy analysis, search engine optimization, marketing analytics, integrated marketing communications, various media vehicles, and much more.

Curriculum

The certificate requires 8 credits of study, comprised of the following four courses.

Code	Title	Credits
MBA 721	Creating and Marketing Innovations	2
MBA 722	Marketing Analytics and Customer Intelligence	2
MBA 723	Digital Marketing	2
MBA 724	Integrated Marketing Communications	2
Total Credits		**8**

Somnath Banerjee, Ph.D.
University of Central Florida, 2015
Field: Marketing

Linlin Chai, Ph.D.
Iowa State University, 2016
Field: Marketing

Rajani Ganesh-Pillai, Ph.D.
University of Central Florida, 2009
Field: Marketing

Fariz Huseynov, Ph.D.
University of Memphis, 2009
Field: Finance

Joseph M. Jones, Ph.D.
University of Missouri-Columbia, 1991
Field: Marketing

Derek Lehmberg, Ph.D.
University of Western Ontario, 2010
Field: Strategic Management

Joshua Marineau, Ph.D.
University of Kentucky, Lexington, 2012
Field: Organizational Behavior

Oudom Hean, Ph.D.
The Ohio State University, 2020
Filed: Economics

Supavich Pengnate, Ph.D.
Oklahoma State University, 2013
Field: Management Information Systems

Michael J. Peterson, Ph.D.
The University of Iowa, 2002
Field: Accounting

Tim O. Peterson, Ph.D.
Texas A&M University at College Station, 1988
Field: Management/Organizational Behavior

Frederick Riggins, Ph.D.
Carnegie Mellon University, 1994
Field: Management Information Systems

Limin Zhang, Ph.D.
University of Arizona, 2005

Field: Management Information Systems

Courses

MBA 701. Strategic Cost Management. 2 Credits.
This course introduces managerial accounting for decision making and control in profit-directed organizations. It also defines product costing, budgetary control systems, and performance evaluation systems for planning, coordinating, and monitoring the performance of a business. Students will understand how modern organizations use managerial accounting to effectively plan and control operations and make sound business decisions. Prereq: Admission to MBA program.

MBA 702. Advanced Financial Management. 2 Credits.
In-depth coverage of concepts and decision-making tools in financial analysis, cost of capital, capital structure, capital budgeting, and dividend policy through analyzing competitive situations and developing strategic views of key financial dimensions. Prereq: Admission to MBA program.

MBA 703. Advanced Organizational Behavior. 2 Credits.
This course is intended to introduce you to the essentials of the most important organizational behavior concepts and principles through instruction, reading, cases, and experience. The course focuses on practical and useful information and skills which will aid you in managing and working in an organization. The course will use evidence-based research to examine and explore the relationship between individual, team, and organizational characteristics and individual outcomes. Prereq: Admission to MBA program.

MBA 704. Supply Chain and Operations Management. 2 Credits.
Study of analysis and decision-making directed at creating, producing, and bringing goods and services to market under uncertain business conditions. Includes techniques from project management, supply chain management, quality management, inventory management, forecasting, and productions planning. Prereq: Admission to MBA program.

MBA 705. Strategic Marketing Management. 2 Credits.
Focus on the conceptual framework, managerial approach and analysis of deploying marketing resources to communicate and deliver value. Prereq: Admission to MBA program.

MBA 706. Managing Information Resources. 2 Credits.
Managerial perspectives on the role of information resources in supporting organizational functions including the strategic use of information systems; use, design, and evaluation of information resources; use of information technologies for managerial decision making, and IT support of different and business functions. Prereq: Admission to the MBA program.

MBA 707. Microeconomics for Managers. 2 Credits.
This course will provide students with an understanding of microeconomic tools for managerial decision making. Students will learn how to use an understanding of economics to make better value maximization decisions for their company. Course topics will include supply/demand principles, demand elasticity and estimation, production and costs, market structure, strategic interaction, complex pricing problems, and decisions under risk. Prereq: Admission to MBA program.

MBA 708. Advanced Strategic Management. 2 Credits.
This course teaches from the perspective of top management, integrating functional business expertise into analysis of the firm's internal resources and capabilities with analysis of the external environment in which the firm competes, to enable formulation and implementation of company strategy. Prereq: MBA 701, MBA 702, MBA 703, MBA 704, MBA 705, MBA 706.

MBA 711. Advanced Investment Analysis. 2 Credits.
This course provides students with a fundamental understanding of investments and the theory and practice of financial valuation. Students will learn how to value a publicly listed company after identifying key internal and external investment factors. Students will deliver a detailed research recommendation on a stock investment idea. Students will use Bloomberg terminals in the Commodity Trading Lab to gain hands-on experience through valuation analysis and have the opportunity to participate in the Student Managed Investment Fund (Bison Fund). This course will also be useful for students who are planning to take the CFA (Chartered Financial Analyst) exams. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 712. Advanced Portfolio Management. 2 Credits.
This course provides students with a fundamental understanding of investments and the theory and practice of modern portfolio management. Students will gain in-depth knowledge of portfolio construction and performance evaluation. Students will use Bloomberg terminals in the Commodity Trading Lab to gain hands-on experience through portfolio management and have the opportunity to participate in the Student Managed Investment Fund (Bison Fund). Students will deliver a written report and detailed presentation of their portfolio results. This course will also be useful for students who are planning to take the CFA (Chartered Financial Analyst) exams. Prereq:Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 713. Financial Derivatives. 2 Credits.
This course is designed to enable students to understand the nature and functions of financial derivatives, including the various futures and options contracts. It covers the role of derivatives markets, the characteristics of derivative products, pricing methodology, and trading strategy of derivatives.

MBA 714. Financial Analysis and Valuation. 2 Credits.
The goal of this course is to develop MBA students' ability to use financial information and related disclosures to evaluate the underlying economics of a firm. This course covers the theory and practice of financial analysis and valuation, and particularly focuses on the analysis, interpretation and prediction of firm financial performance, such as profitability and risks, operating and non-operating cash flows, and management of strategic financing and investing. Prereq: Admission to the MBA program.

MBA 721. Creating and Marketing Innovations. 2 Credits.
This course focuses on creating and enhancing customer value though new products and services. Students will learn the value of new product strategy and new product development process from opportunity identification to launch. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 722. Marketing Analytics and Customer Intelligence. 2 Credits.
This course takes a very hands-on approach with customer intelligence and equips students with the marketing science understanding and techniques they need to solve real-world marketing challenges. This course uses a combination of lectures, cases, and exercises. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 723. Digital Marketing. 2 Credits.
This course focuses on understanding, managing and analyzing an organization's digital marketing strategy. Topics related to online business models, search engine optimization, paid search and display advertising, web analytics, email marketing, social media marketing and reputation management will be considered. Prereq: Admission to the MBA program.

MBA 724. Integrated Marketing Communications. 2 Credits.
This course focuses on marketing communications management in terms of strategy development, implementation, and evaluation. It examines the effects of changing environmental circumstance on integrated marketing communications and promotional strategy - budget allocation, messages, and media vehicles adopted. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 731. Leading and Managing Teams. 2 Credits.
This course is designed to prepare students to effectively develop, lead, and manage teams. We will examine and practice team development. We will examine critical team processes and how to manage these processes. We will have the opportunity to practice both the management skills and leadership skills necessary to have effective collaboration among team members. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 732. Managerial Leadership: Essential Competencies. 2 Credits.
This course is designed to prepare graduate students for the role of being a managerial leader. We will examine and practice the essential competencies such as creating a compelling purpose, role clarification inspiration/motivation, problem solving, team building needed as a manager and a leader. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 733. Management Decision Making. 2 Credits.
This course provides tools and experiences to allow managers to become more sophisticated and effective decision makers. It examines logical processes relating to decision making, but also incorporates behavioral and organizational aspects of decision making. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 734. Negotiations. 2 Credits.
This course is designed to provide practical negotiating knowledge primarily through hands-on experiential exercises. Topics covered are useful to the practicing manager and readings and lectures are designed to reinforce lessons learned during actual negotiations. Some of the topics covered: using agents in negotiation, establishing value, distributive and integrative bargaining, working across diverse contexts, and employing (and defending) against common negotiation tactics. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 735. Global Business. 2 Credits.
This course exposes students to economic, financial, marketing, and strategic views of international business to enable students to better understand the challenges and opportunities firms face competing in the global business arena. Prereq: Admission to the MBA program.

MBA 736. Managing Conflict in Organizations. 2 Credits.
Study of conflict and conflict management in organizational contexts. Topics include conflict styles, conflict resolution, conflict management, conflict analysis, and positive and negative effects of conflict.

MBA 751. Business Analytics Concepts. 2 Credits.
This course covers important business data analytics concepts including data warehousing, OLAP, ETL, data mining, self-service business intelligence, and business reporting and visualization tools. It provides hands-on experience in the use of some popular data analytics software tools with a focus on aiding managerial decision-making across different business functional areas. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 752. Business Analytics Strategy. 2 Credits.
Case-based discussion course examining how data analytics impact organizations today and issues related to the development of an overall business data analytics organizational strategy. Topics include business data analytics in organizations and its impact on business functional areas, strategic use of data and information, ethical issues related to data collection and usage, social and legal implications of pervasive digitization, and management of intellectual property. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 753. Business Analytics Methods. 2 Credits.
This managerially-oriented course covers the use of analytic tools to generate predictive models such as logistic regression, decision trees, neural networks, and cluster analysis to generate deeper business insights in direct support of managerial decision making. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 793. Individual Study/Tutorial. 1-5 Credits.

MBA 796. Special Topics. 1-5 Credits.

MBA 893. Individual Study/Tutorial. 1-5 Credits.

Business Analytics

Department Information

- **Program Director:**
  Fone Pengnate, Ph.D.
- **Program Advisor:**
  Elizabeth Worth, M.Ed.
- **Email:**
  elizabeth.worth@ndsu.edu
- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-6038
- **Department Web Site:**
  www.ndsu.edu/business/programs/graduate/msba/ (http://www.ndsu.edu/business/programs/graduate/msba/)
- **Credential Offered:**
  M.S.
- **Test Requirement:**
  GMAT or GRE
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

The Master of Science in Business Analytics (MSBA) program at North Dakota State University (NDSU) is a non-thesis, professional program structured to serve qualified students with undergraduate degrees in a variety of fields, although it may be particularly attractive to students with undergraduate degrees in business, computer science, engineering, and statistics. The program is designed to provide students with advanced applied problem solving skills and an understanding of business analytics methodologies and tools mastery. Students get hands-on experience with the most up-to-date tools and methodologies for data management, data modeling, visualization, and data mining.

NDSU business analytics faculty use a variety of teaching methods including case studies, group and individual projects, computer applications, student presentations, and discussion. Many classes take place in the Barry Hall computer labs. The program has a significant capstone experience where students work with local companies analyzing real data and solving real-world problems with data. The program is designated as a STEM program reflecting the technical nature of current data analytics practices.

In addition to the Graduate School application requirements, an official GMAT or GRE exam score is required. Individuals seeking admission to the MSBA program may request a waiver of the GMAT/GRE requirement if they meet either of the following requirements:

- The applicant holds a terminal degree (e.g., Ph.D., M.D., J.D.).
- The applicant has a minimum of five (5) years of recent, post-bachelor's, full-time, professional work experience that is relevant to business analytics and data science.

Appropriate documentation (i.e. official transcript(s), Statement of Purpose, resume) must be uploaded to the application file. It does not, however, guarantee a waiver. Applicants should request the waiver in their Statement of Purpose and provide the rationale for the waiver request. Applicants are reviewed on a case-by-case basis, and waiver approval is determined at the discretion of the MSBA program coordinator.

MSBA Program Curriculum (30 credits):

Code	Title	Credits
Data Analysis Foundations		**5-6**
CSCI 765	Introduction to Database Systems	2-3
or MIS 710	Database Management	
STAT 725	Applied Statistics	3

Business Analytics Foundations		**10**
MBA 722	Marketing Analytics and Customer Intelligence	2
MBA 723	Digital Marketing	2
MBA 751	Business Analytics Concepts	2
MBA 752	Business Analytics Strategy	2
MBA 753	Business Analytics Methods	2
Business Analytics Advanced Courses		**6**
MIS 720	Visualization and Reporting	2
MIS 740	Advanced Business Analytics Methods	2
MIS 790	Graduate Seminar	2
Business Analytics Focus and Field Experience		**8-9**
Electives - choose from approved list or with advisory's approval		3-4
MIS 795	Field Experience	5

Somnath Banerjee, Ph.D.
University of Central Florida, 2015
Field: Marketing

James Caton, Ph.D.
George Mason University, 2016
Field: Economics

Linlin Chai, Ph.D.
Iowa State University, 2016
Field: Marketing

Anne Denton, Ph.D.
University of Mainz, 1996
Field: Computer Science

Supavich Pengnate, Ph.D.
Oklahoma State University, 2013
Field: Management Information Systems

Frederick Riggins, Ph.D.
Carnegie Mellon University, 1994
Field: Management Information Systems

Limin Zhang, Ph.D.
University of Arizona, 2005
Field: Management Information Systems

Business Analytics Certificate

Department Information

- **Program Director:**
  Fred Riggins, Ph.D.
- **Program Advisor:**
  Elizabeth Worth, M.Ed.
- **Email:**
  elizabeth.worth@ndsu.edu
- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-6038
- **Department Web Site:**
  www.ndsu.edu/business/programs/graduate/graduate_certificates/ (http://www.ndsu.edu/business/programs/graduate/graduate_certificates/)

- **Credential Offered:**
  Graduate Certificate

The Business Analytics graduate certificate equips working professionals with methodologies and analytical tools needed to analyze data available in modern organizations. Participants will learn to use advanced spreadsheet functionality, dashboard visualization tools, and report generators for descriptive analytics to understand and report on historical data. In addition, participants will use data mining and other advanced methodologies for predictive and prescriptive analytics to understand future trends.

Curriculum

The certificate requires 8 credits of study, comprised of the following four courses.

Code	Title	Credits
MBA 751	Business Analytics Concepts	2
MBA 752	Business Analytics Strategy	2
MBA 753	Business Analytics Methods	2
MBA 722	Marketing Analytics and Customer Intelligence	2

Cellular and Molecular Biology

Department Information

- **Program Coordinator:**
  Katie Reindl, Ph.D.
- **Department Web Site:**
  www.ndsu.edu/cellularmolecularbiology/ (http://www.ndsu.edu/cellularmolecularbiology/)
- **Application Deadline:**
  February 15 is the deadline for applicants seeking consideration of financial assistance (fellowship, assistantships) for fall semester and July 1 for spring semester.
- **Credential Offered:**
  Ph.D.
- **Test Requirement:**
  GRE required for applicants who have not earned a degree in the U.S. or any international applicants who have not earned a master's degree.
- **English Proficiency Requirements:**
  TOEFL 79, IELTS 6.5, Duolingo 105

The Cellular and Molecular Biology (CMB) program, approved 1988, was the first interdisciplinary graduate program at North Dakota State University (NDSU). The program was designed to respond to the evolving nature of research in the life sciences in which it was recognized that biological phenomena emerge from molecular and cellular events and that the elucidation of such processes increasingly relies on multidisciplinary approaches.

The CMB program provides cross training of graduate students in the areas of biochemistry and cellular and molecular biology. In this setting, students learn the most up-to-date approaches from a variety of fields. Integration across concepts, as well as the application of various approaches to addressing biological problems, is developed through their preliminary examination, in which students are required to author a research proposal in the format of a national granting agency and to defend it orally. The students also develop and conduct an original line of research under the supervision of their major adviser. The program also brings together faculty with common interests and who use common approaches and equipment. Such a community of scientists fosters collaboration and engenders a sense of cooperation that leads to shared use of common equipment.

The CMB program prepares students for careers in academia and private industry. All program graduates are in permanent positions in their field or are engaged in post-doctoral training.

Nearly 40 faculty members in many different departments and representing a variety of colleges participate as faculty mentors. The CMB program coordinator receives guidance on policy, procedure, and program administration from a multidisciplinary group of faculty who serve on the CMB Steering Committee.

Program Objectives

The CMB program is designed to respond to the evolving nature of research in the life sciences in which it was recognized that biological phenomena emerge from molecular and cellular events and that the elucidation of such processes increasingly relies on multidisciplinary approaches. In addition, new applications of sensor technology, disease diagnosis and treatment, and other emerging technologies require that scientists work across historical boundaries of their disciplines.

This is a research-oriented degree that requires advanced skills areas of biochemistry, cellular biology, molecular biology, and contemporary research techniques. Prospective students must have a high quantitative aptitude and be prepared to undertake rigorous graduate-level training in research including quantitative methods.

The Cellular and Molecular Biology Ph.D. program is open to qualified graduates of universities and colleges of recognized standing. For consideration for full-standing admission, the applicant must:

- Hold a baccalaureate degree from an educational institution of recognized standing.
- Have earned a cumulative grade point average (GPA) in all courses of at least 3.0 or equivalent at the baccalaureate level. Applications are at any time.
- Have adequate preparation and show potential to undertake advanced study and research as evidenced by academic performance and experience.
- If possible, applicants should identify at least one Cellular and Molecular Biology faculty member with whom they wish to study.

A recent score (within 12 months) for the general Graduate Record Examination or successful completion of a relevant M.S. degree is required. No minimum GRE score is required, but investigators may use this as a piece of evidence in consideration of the student's application. International students are required to have proficiency in English as shown by a TOEFL iBT of 71 or higher or an IELTS of 6 or higher, unless they have matriculated from an institution in which instruction is conducted in English.

The following undergraduate courses are required for graduate work in the CMB program:

- **Biology** - One year of general biology with laboratory and one course in genetics are required. Cellular biology or cellular physiology, animal or plant physiology, and microbiology are recommended.
- **Chemistry -** One year of general chemistry with laboratory and two sequential terms of organic chemistry with laboratory are required. Biochemistry is recommended.
- **Mathematics -** Two terms of life sciences calculus are required.
- **Physics** - Two sequential terms of general physics with laboratories (above the concept level) are required.
- **Recommended** - introductory courses in computer science, statistics, and technical writing.
- With program approval, students may take up to three courses within the first year of resident study to correct deficiencies in required courses. These courses may not be used on the Plan of Study or towards the credits required to complete the degree.

Applicant Selection

Applications for the CMB program are accepted on a rolling basis throughout the year; however, for full consideration for a CMB program stipend, application must be made by the deadlines listed for fall admission (July 1). Acceptance into the program is based upon both the quality of the application and the capacity of the program.

As a program that encompasses many departments and core areas of research, as well as being an interdisciplinary training program, it is helpful to potential advisers to know what aspects of research the student is interested in. Students are encouraged to explore potential advisers' work and

identify areas of interest that align with one or more CMB faculty research program(s). These areas should be addressed in the applicant's statement of purpose. If an applicant is open to a broad range of research, it is helpful to identify that as well (for example, working with plant genetics, any aspect of infectious disease, aspects of either cancer biology or therapeutics, etc.). Students are only admitted to the program if a successful match with a CMB faculty member can be made, so this is a critical aspect of the application demonstrating what the student will bring to the research endeavor.

Participating Departments/Programs

North Dakota State University offers an interdisciplinary program leading to the doctoral degree in Cellular and Molecular Biology. The CMB program is a joint effort of the colleges of Agriculture, Food Systems, Natural Resources; Science and Mathematics; Health Professions; and Engineering and includes the departments of Animal Sciences, Biological Sciences, Chemistry and Biochemistry, Coatings and Polymeric Materials, Electrical & Computer Engineering (Bioengineering), Microbiological Sciences, Pharmaceutical Sciences, Physics, and Plant Sciences.

Financial Assistance

Self-funded students who provide their own support through sponsored funding sources (governmental or grant funding only) may contact CMB faculty members with whom they wish to work or the CMB Director to inquire which investigators are accepting students so that a successful research mentorship can be arranged.

While the CMB program offers a limited number of competitive graduate assistantships, financial support is usually provided by the department or laboratory in which the student will carry out research. Therefore, applicants are encouraged to research participating faculty members' areas of expertise and identify them in their statement of purpose. Students are encouraged to contact those with whom they would like to work regarding availability of positions and funding. In instances where specific investigators are not identified in the Statement of Purpose, the Director will contact faculty members who are accepting new students for their appraisal of the application.

In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

Code	Title	Credits
Required Courses		
BIOC 674	Methods of Recombinant DNA Technology	3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
BOT 820		3
Doctoral Dissertation Research		
Each student is expected to seek out professional development by attending regular seminars in their home department or in conjunction with their research interests (for example, a seminar series or COBRE science series). Students are required to present at least one scientific seminar per year throughout the program. In addition, students will supplement their knowledge of molecular biology, cell biology, and research techniques by fulfilling the remaining credits in their plan of study with a selection from the following list of electives. Other appropriate electives may be used if approved by the student's supervisory committee, as well as the program director with input from the Steering Committee:		
ANSC 758	Molecular Biological Techniques in Animal Sciences	3
ANSC 773	Energy Metabolism	3
ANSC 774	Nitrogen Metabolism	3
ANSC 813	Domestic Animal Endocrinology	3
ANSC 828	Advanced Reproductive Biology	3
ANSC 830	Growth Biology	3
ANSC 875	Vitamins and Minerals	3
BIOC 673	Methods of Biochemical Research	3
BIOC 675	Computer Applications in Biochemistry and Molecular Biology	3
BIOC 683	Cellular Signal Transduction Processes and Metabolic Regulation	3
BIOC 716	Protein and Enzyme Biochemistry	3
BIOC 719	Molecular Biology of Gene Expression and Regulation	3
BIOC 723	Structural Basis of Membrane Transport and Signaling	3
BIOL 679	Biomedical Genetics and Genomics	3
CHEM 728	Physical Methods for Chemical and Biomolecular Research	2
CHEM 729	X-Ray Structure Determination	2
CPM 771	Modern Methods of Polymer Characterization	3
ECE 713	Introduction to Lab-on-a-Chip Technology	3
MICR 775		3
MICR 781	Advanced Bacterial Physiology	3
MICR 783	Advanced Bacterial Genetics and Phage	3
PLSC 684	Plant Tissue Culture and Biotechnology	3
PLSC 721	Genomics Techniques	2
PLSC 731	Plant Molecular Genetics	3
PPTH 759	Host-Parasite Genetics	3
PPTH 760	Fungal Genetics	4
PSCI 746	Neuropharmacology	3
PSCI 747	Cardiovascular Pharmacology	3
PSCI 762	Advanced Biopharmaceutics	2
PSCI 765	Cancer Cell Biology	2
ZOO 682		3

Research

In addition to didactic credits, students take research credits to fulfill their dissertation studies on a topic of significant and original work. They must pass an oral and written preliminary examination which signifies their matriculation to doctoral candidacy. They also present a public presentation of their work in conjunction with a final dissertation examination on their research to attain the doctoral degree.

Laura Aldrich-Wolfe
Biological Sciences

Cornell University, 2006
Field: Community Ecology, Mycorrhizas, Plant-Fungal Interactions

Julia Bowsher
Biological Sciences
Duke University, 2007
Field: Evolutionary Development and Biology

Yongki Choi
Physics
City University of New York, 2010
Field: Early Detection of Cancer Cells, Single Molecule Enzymology, Biotechnology

Christopher Colbert
Chemistry and Biochemistry
Purdue University, 2000
Field: Structure Biology with a Focus on the Biochemistry of Proteins Involved In Iron Import and Utilization

Carl Dahlen
Animal Sciences
University of Minnesota, 2009
Research Interests: Beef Cattle Production

Glenn Dorsam
Microbiological Sciences
Virginia Commonwealth University, 1998
Field: Epigenetic Regulation

Kendra Greenlee
Biological Sciences
Arizona State University, 2004
Field: Developmental Physiology and Immunology

Tim Greives
Biological Sciences
Indiana University, 2009
Endocrine Regulation of Seasonality, Reproductive Neuroendocrinology, Hormones and Behavior

Ang Guo
Pharmaceutical Sciences
Chinese Academy of Sciences - 2010
Field: Cardiovascular Disease

Stuart Haring
Chemistry and Biochemistry
Texas A&M University, 2013
Field: Cellular DNA Duplication (Replication) and Mutation Prevention (Repair)

Britt Heidinger
Biological Sciences
University of Iowa, 2004
Field: Physiological Ecology

Yagna Jarajapu
Pharmaceutical Sciences
Indiana University, 2007
Field: Bone Marrow Dysfunction and Vascular Repair in Diabetes, ACE2-Angiotensin-(1-7)/Mas Receptor Pathway in Bone Marrow Cells, Regulation of Bone Marrow Mobilization by Leptin

Jiha Kim
Biological Sciences
University of Georgia, 2006
Field: Tumor Microenvironment

Estelle Leclerc

Pharmaceutical Sciences
Glasgow Caledonian University, 2002
Field: Melanoma, Pancreatic Cancer; Monoclonal Antibodies as Diagnostic and Therapeutic Agents; Mechanism of RAGE Signaling

Guodong Liu
Chemistry and Biochemistry
Hunan University, 2001
Field: Development of Nano-Bioprobes for Biosensors and Bioassays for Detection of Nucleic Acids and Proteins

Phil McClean
Plant Sciences
University of Paris XI, 1994
Field: Dry Bean Genetics and Biotechnology

Dharmakeerthi "Keerthi" Nawarathna
Electrical and Computer Engineering
University of Houston, 2005
Field: Biomedical Engineering

Stephen O'Rourke
Pharmaceutical Sciences
University of Wisconsin-Madison, 1995
Field: Cerebral Vascular Function in Health and Disease

Birgit Pruess
Microbiological Sciences
Ruhr-Universitat Bochum, 1991
Field: Bacterial Physiology, Biofilm Biology, and Food Safety

Mohi Quadir
Coatings and Polymeric Materials
Freie University of Berlin, 2010
Field: Polymeric Materials for Drug Delivery

Sheela Ramamoorthy
Microbiological Sciences
Virginia Polytechnic Institute and State University, 2006
Field: Virology, Immunology, and Vaccinology

Jiajia Rao
Plant Sciences
University of Massachusetts-Amherst, 2013
Field: Food Chemistry and Ingredient Technology

Katie Reindl
Biological Sciences
North Dakota State University, 2006
Field: Cancer Cell Biology and Pharmacology

Lawrence Reynolds
Animal Sciences
Iowa State University, 1983
Field: Nutrition and Pregnancy in Ruminants

Kenton Rodgers
Chemistry and Biochemistry
University of Iowa, 1988
Field: Inorganic and Bioinorganic Chemistry

Jane Schuh
Microbiological Sciences
North Dakota State University, 2002
Field: Environmental Allergic Asthma Triggered By Mold

Sangita Sinha

Chemistry and Biochemistry
Purdue University, 2000
Field: Biochemistry and Structural Biology of Host-Pathogen Interactions

Sarah Signor
Biological Sciences
University of California-Davis, 2013
Field: Insect Evolutionary Genomics

Kristine Steffen
Pharmaceutical Sciences
North Dakota State University, 2007
Field: Biology of Obesity and Post-Bariatric Outcomes, Gastrointestinal Microbiome Research

Chengwen Sun
Pharmaceutical Sciences
Jilin University, 2000
Field: Blood Pressure Regulation, Cell Signaling

Kendall Swanson
Animal Sciences
University of Kentucky, 2000
Field: Ruminant Nutrition, Energy Metabolism, Protein Metabolism, Pancreatic Function, Beef Cattle Production

Sathish Venkatachalem
Pharmaceutical Sciences
University of Madras
Field: Pulmonary Physiology and Pharmacology

Danling Wang
Electrical and Computer Engineering
Peking University, 2003; University of Washington, 2014
Field: Sensor Design, Fabrication, and Application of Early-State Human Disease Monitoring and Diagnosis

John Wilkinson
Chemistry and Biochemistry
Vanderbilt University, 2001
Field: Cancer Cell Metabolism, Cell Death Pathways, Mitochondrial Gene Expression, Animal Models of Tumorigenesis

Qifeng Zhang
Electrical and Computer Engineering
Peking University, 2001
Field: Nanomaterials for Sensor and Biomedical Applications, Nanotechnology

Cereal Science

Department Information

- **Department Chair:**
  Richard Horsley, Ph.D.
- **Program Coordinator:**
  Frank Manthey, Ph.D.
- **Department Location:**
  Plant Sciences, Loftsgard Hall
- **Department Phone:**
  (701) 231-7971
- **Department Web Site:**
  www.ndsu.edu/agriculture/academics/academic-units/plant-sciences/graduate-programs (http://www.ndsu.edu/agriculture/academics/academic-units/plant-sciences/graduate-programs/)
- **Application Deadline:**
  International applications are due May 1 for fall and October 1 for spring. Domestic applicants should apply at least one month prior to the start of classes.
- **Credential Offered:**

Ph.D., M.S.

- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

Cereal Science is a graduate program in the College of Agriculture Food Systems and Natural Resources and is administered by the Department of Plant Sciences. The Cereal Science graduate program offers graduate study leading to the Master of Science (M.S.) and Doctor of Philosophy (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.

Research Facilities and Equipment

Faculty in the Cereal Science graduate program maintain specialized equipment that evaluates cereal and food quality, including laboratory equipment such as an ICP spectrophotometer, gas chromatographs, LC-MS, GC-MS, high-performance liquid chromatographs, various electrophoretic devices, a differential scanning calorimeter, and Rapid ViscoAnalyzer.

Flour mills, ranging up to pilot-plant size; two completely equipped bake shops; continuous bread-baking equipment; rheological instruments for dough testing; several pasta-processing units; malting equipment; Asian noodle making equipment; soy milk/tofu processing machines; a wet processing pilot plant; laboratory-scale UHT processing unit; HT/ST extruder; and a microbrewery are some examples of the specialized equipment.

The Cereal Science program has a close working relationship with both the Northern Crops Institute and the USDA Hard Red Spring and Durum Wheat Quality Laboratory. All three are located in the newly opened (June 2024) Peltier Complex. This 85 million dollar facility supports a wide range of research involving food science, meat science, muscle biology, food safety, nutrition, consumer sensory traits, and the development of new agricultural products.

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. In addition to a stipend, graduate assistants receive a tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

Selection of the major adviser will be made based on 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 student's major adviser .

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 advisor, a supervisory/advisory and examining committee is established and a plan of study developed. The student is required to prepare and defend a written research proposal. The plan of study and written research proposal must be approved within the first four and six months of study, respectively. For M.S. students, a final oral examination is required, where the student defends the thesis and is asked questions covering academic subject matter.

Code	Title	Credits
CFS 650	Cereal Technology	3
CFS 790	Graduate Seminar	2
PLSC 710	Professional Development I	1
CFS 798	Master's Thesis	10
Statistics (one of the following courses)		**3**
PLSC 724	Field Design I	
STAT 662	Introduction to Experimental Design	
STAT 725	Applied Statistics	
Technology Group		**6**

CFS 630		
CFS 670	Food Processing II	
CFS 671	Food Processing Laboratory	
CFS 758	Fundamentals of Flour Testing and Bakng (s/b Baking)	
CFS 759	Milling	
CFS 760	Pasta Processing	
CFS 761	Malting and Brewing	
Science Group		**6**
MICR 653	Food Microbiology	
CFS 660	Food Chemistry	
CFS 661	Food Chemistry Laboratory	
CFS 662	Food Ingredient Technology	
CFS 664	Food Analysis	
CFS 672	Cereal and Food Fermentation	
CFS 674	Sensory Science of Foods	
CFS 764	Carbohydrate Chemistry	
CFS 765	Advanced Cereal and Food Chemistry I	
CFS 766	Advanced Cereal and Food Chemistry II	
MICR 752		
Total Credits		30 (minimum)

Doctorate of Philosophy (Ph.D.)

The Ph.D. requires 90 credits post-baccalaureate. If a student has previously earn a master's degree, no fewer than 60 credits are required to complete the Ph.D.

The Ph.D. program requires the completion of a minimum of 31 semester credits of required course work with an overall GPA of 3.0 or better, as well as 25 research credits (CFS 899). Remaining credits can be fulfilled as elective courses or as additional research credits (CFS 899). With assistance from the advisor, a supervisory/advisory and examining committee is established and a plan of study developed.

The student is required to prepare and defend a written research proposal. The plan of study and written research proposal must be approved within the first six and nine months of study, respectively. Ph.D. candidates are required to take a preliminary written and oral examination covering academic subject matter and a final oral defense of a research-based dissertation.

Code	Title	Credits
CFS 650	Cereal Technology (Students that have previously taken CFS 650 can opt to take additional CFS 899 credits or another 600/700 course worth 3 credits.)	3
PLSC 710	Professional Development I	1
PLSC 711	Professional Development II	1
CFS 765	Advanced Cereal and Food Chemistry I	4
CFS 766	Advanced Cereal and Food Chemistry II	4
PLSC 790	Graduate Seminar	2
CFS 892	Graduate Teaching Experience	2
PLSC 899	Doctoral Dissertation	30
Statistics (one of the following courses)		**3**
STAT 662	Introduction to Experimental Design	
PLSC 724	Field Design I	
STAT 725	Applied Statistics	
Technology Group		**9**
CFS 630		
CFS 670	Food Processing II	
CFS 671	Food Processing Laboratory	
CFS 759	Milling	
CFS 760	Pasta Processing	

CFS 761	Malting and Brewing	
Science Group		**6**
CFS 660	Food Chemistry	
CFS 661	Food Chemistry Laboratory	
CFS 662	Food Ingredient Technology	
CFS 664	Food Analysis	
CFS 672	Cereal and Food Fermentation	
CFS 674	Sensory Science of Foods	
CFS 764	Carbohydrate Chemistry	
MICR 752		
Additional Credits		30

- 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 supervisory committee.

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 210 Introduction to Food Science and Technology, CFS 370 Food Processing I, MATH 146 Applied Calculus I or higher and CHEM 121 General Chemistry I.
- Must have completed or be concurrently taking MICR 350 General Microbiology, CHEM 341 Organic Chemistry I and BIOC 460 Foundations of Biochemistry and Molecular Biology I. MICR 202 Introductory Microbiology, CHEM 240 Survey of Organic Chemistry, and BIOC 260 Elements of Biochemistry courses, respectively, cannot serve as substitutes for the aforementioned courses.

Rules for Accepted Students:

- All admissions will be conditional. The minimum condition is completion of the B.S. degree prior to full standing in M.S. program.
- No undergraduate courses (100-400) may be counted toward a M.S. degree.
- Courses completed at the 600 level prior to be accepted to the program may be counted toward a M.S. degree.
- A maximum of 15 credits in the M.S. program can be used to meet the requirements for the B.S. degree.
- Students entering the M.S. degree with a B.S. degree in hand may not use courses earned as part of the bachelors program for the M.S. requirements.
- The student must meet all of the requirements that would normally be expected of a student in the M.S. program.
- All incoming graduate students will be given a written examination before the beginning of their first semester to assess their proficiency in English / scientific writing.
- Graduate stipend or assistantship will not be provided until B.S. degree is granted. However, students are eligible for hourly funding (time slip) if available. Upon completion of the B.S. degree requirement, students are eligible for and assistantships pending availability.

Bingcan Chen, Ph.D.
University of Massachusetts-Amherst, 2012
Research Interests: Food and Cereal Chemistry

Shahidul Islam, Ph.D.
University of Western Australia, 2013

Research Interests: Grain and End-Use Quality of Hard Wheat

Zhao Jin, Ph.D.
Jiangnan University, 2014
Research Interests: Malting and Brewing

Frank Manthey, Ph.D.
North Dakota State University, 1985
Research Interests: Durum Wheat Quality, Pasta/Noodle Processing, and Milling

Jiajia Rao, Ph.D.
University of Massachusetts-Amherst, 2013
Research Interests: Food Chemistry and Ingredient Technology

Kalidas Shetty, Ph.D.
University of Idaho, 1989
Research Interests: Plant Metabolism and Food Security

Anuradha Vegi, Ph.D.
North Dakota State University, 2008
Research Interests: Teaching Techniques

Minwei Xu, Ph.D.
North Dakota State University, 2019
Research Interests: Food Processing Technology

Affiliate/Adjunct Faculty

Linda Dykes, Ph.D.
Texas A&M University, 2008
Research Interests: Wheat Quality

Jae Ohm, Ph.D.
Kansas State University, 1996
Research Interests: Cereal Chemistry

Chemistry

Department Information

- **Department Chair:**
  Gregory Cook, Ph.D.
- **Graduate Coordinator:**
  Uwe Burghaus, Ph.D.
- **Department Location:**
  Ladd Hall
- **Department Phone:**
  (701) 231-8694
- **Department Web Site:**
  www.ndsu.edu/chemistry/ (http://www.ndsu.edu/chemistry/)
- **Application Deadline:**
  April 15 for fall, October 31 for spring. Spring admissions depend on the availability of fellowships and faculty interests. If there are no spring openings, spring applications are automatically considered for the subsequent fall semester.
- **Credential Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE required for applicants who have not earned a degree in the U.S. GRE (general and subject recommended for domestic applicants, but not required)
- **English Proficiency Requirements:**
  RA - TOEFL 71, IELTS 6, Duolingo 100; TA Grader - TOEFL 79, IELTS 6.5, Duolingo 110; TA Instructor - TOEFL 81, IELTS 7, Duolingo 115

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. Consequently, 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. students, leaving later years for full-time thesis or dissertation research. The typical time to complete a graduate degree averages three years for the M.S. degree and approximately five years for the Ph.D.

Research Opportunities and Infrastructure

The Department of Chemistry and Biochemistry is a research intensive department with funded research programs spanning areas from materials to medicine. External research grants from the National Science Foundation, National Institutes of Health as well as many other public and private agencies support the graduate programs in the department.

All research and most teaching activities within the department occur within two centrally-located buildings. Sugihara Hall, a 100,000 square foot modern research facility, was opened in January 2022 to house the department offices, core instrument facilities and research labs. Research is also carried out in the Quinten Burdick building directly across the street from Sugihara Hall.

The department facilities house both teaching and research labs, glassblowing facilities, as well as stockroom and multiuser equipment for the campus. 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 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. The department also has modern 400 and 500 MHz Nuclear Magnetic Resonance (NMR) spectrometers for research with specialized capabilities for both small molecule analysis and protein NMR. The Materials Characterization Laboratory houses the departmental X-ray crystallography facilities and a brand new Analytical Ultracentrifuge. In addition to materials characterization, a Core Biology Facility that serves multiple users is housed within the department for performing bioassays, cell and tissue culture work, and molecular biology experiments. The facility has 96- and 384-well plate fluorimeters, culture changers, flow hoods, RT-PCR and FPLC protein purification instrumentation. All core facilities are staffed with highly trained technical staff for scientific consultation and training.

Prospective students are encouraged to visit the **Department of Chemistry and Biochemistry website** for contact and more information.

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 by either teaching assistantships (TA) or research assistantships (RA). The standard stipend is $24,000 per year for both Research Assistants (RA) and Teaching Assistants (TA). In addition to the stipend, graduate assistants in good standing receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

Master of Science

The Master of Science program requires the completion 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 include at least 16 semester credits of didactic course work (https://catalog.ndsu.edu/graduate/graduate-school-policies/).

Code	Title	Credits
Required Courses		
CHEM 720	Introduction to Chemical Research	2
CHEM 790	Graduate Seminar (second year seminar)	1
or BIOC 790	Graduate Seminar	
UNIV 720		1
CHEM 790	Graduate Seminar (defense seminar)	1
or BIOC 790	Graduate Seminar	
Didactic Credits (601-689, 691; 700-789, 791; 800-889 and 891)		16 *
CHEM 798	Master's Thesis	6-10
or BIOC 798	Master's Thesis	

Total Credits Required		**30**
As part of total semester credits, the following departmental courses are recommended for students based on discipline:		
Analytical		
CHEM 632	Analytical Chemistry II	3
CHEM 730	Separations	2
CHEM 732	Advanced Survey of Analytical Chemistry	4
CHEM 736	Mass Spectrometry	2
Biochemistry and Molecular Biology		
BIOC 673	Methods of Biochemical Research	3
BIOC 674	Methods of Recombinant DNA Technology	3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
Inorganic		
CHEM 724	Chemical Applications of Group Theory	1
CHEM 725	Advanced Survey of Inorganic Chemistry	3
CHEM 727	Organometallic Chemistry	3
CHEM 728	Physical Methods for Chemical and Biomolecular Research	2
CHEM 744	Organic Spectroscopy	2
Organic		
CHEM 741	Physical Organic Chemistry I	4
CHEM 742	Physical Organic Chemistry II	2
CHEM 744	Organic Spectroscopy	2
CHEM 745	Organic Synthesis	4
Physical		
BIOC 665		
CHEM 760	Statistical Thermodynamics	4
CHEM 763	Kinetics	2
CHEM 764	Dynamics	2

*
A minimum of 10 must be from courses numbered 701-789; 791 or 800-889; 891

Doctor of Philosophy

The Ph.D. program requires the completion of 90 graduate semester credits, post-baccalaureate, with an overall GPA of 3.0 or better. This total must comprise credits from both didactic and non-didactic work. Non-didactic credits must include those earned in research and seminars. The didactic credits (https://catalog.ndsu.edu/graduate/graduate-school-policies/) must total at least 19 for the required courses listed below.

Code	Title	Credits
Required Didactic Courses		
CHEM 720	Introduction to Chemical Research	
UNIV 720		
CHEM 725	Advanced Survey of Inorganic Chemistry	
CHEM 732	Advanced Survey of Analytical Chemistry	
CHEM 741	Physical Organic Chemistry I	
CHEM 759	Advanced Survey of Physical Chemistry	
Required Non-Didactic Courses		
CHEM 790	Graduate Seminar (second year seminar)	
CHEM 790	Graduate Seminar (proposal seminar)	
CHEM 790	Graduate Seminar (defense seminar)	
CHEM 899	Doctoral Dissertation (Number of research credits determined by student and supervisory committee)	

Additional credits numbered 601 - 689, 691, 700 - 789 and 791 may also count toward the 90 credit total required by the College of Graduate and Interdisciplinary Studies if approved by the student's advisory and examination committee.	
Total Credits	90

*

A student matriculating with a master's degree, including one earned at an international institution, must earn not fewer than 60 graduate credits at NDSU. These credits must include the 19 listed above under Required Didactic Courses. Courses numbered 601-689 may be used for the Plan of Study as long as they have not been taken in an undergraduate or previous graduate program. Approved courses are Department of Chemistry & Biochemistry 625, 626, 627, 628. 630, and 676.

ADDITIONALLY, The following departmental courses ARE available for students; CONSULT WITH COMMITTEE FOR RECOMMENDATIONS:

Code	Title	Credits
Analytical		
CHEM 632	Analytical Chemistry II	3
CHEM 730	Separations	2
CHEM 736	Mass Spectrometry	2
Biochemistry and Molecular Biology		
BIOC 673	Methods of Biochemical Research	3
BIOC 674	Methods of Recombinant DNA Technology	3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
Inorganic		
CHEM 724	Chemical Applications of Group Theory	1
CHEM 727	Organometallic Chemistry	3
CHEM 728	Physical Methods for Chemical and Biomolecular Research	2
CHEM 744	Organic Spectroscopy	2
Organic		
CHEM 742	Physical Organic Chemistry II	2
CHEM 744	Organic Spectroscopy	2
CHEM 745	Organic Synthesis	4
Physical		
CHEM 665	Survey of Physical Chemistry	4
CHEM 760	Statistical Thermodynamics	4
CHEM 763	Kinetics	2
CHEM 764	Dynamics	2
CHEM 676	Introduction to Computational Quantum Chemistry	3

Each student chooses a thesis adviser within six months of beginning graduate school. As this is one of the most important decisions made in graduate school, students are strongly urged to visit multiple faculty members to discuss research opportunities. In addition, faculty seminars during the fall semester are designed to acquaint new students with the available research programs.

By the end of the first academic year, each student selects an advisory and examination committee, which consists of the thesis adviser, two other faculty members in the chemistry department, and one faculty member from a department outside the Department of Chemistry and Biochemistry.

Admission to candidacy for the Ph.D. degree is accomplished by satisfying three requirements:

1. satisfactory performance in course work with a minimum 3.0 grade point average,
2. satisfactory performance in comprehensive examinations taken by the end of the 4th semester, and
3. satisfactory defense of an original research proposal on a topic approved by the student's supervisory 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 supervisory committee.

Philip Boudjouk
University of Wisconsin, 1971
Postdoctoral, UC Davis, 1971-1973

Research Area: Main Group Organometallic Chemistry, Materials

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

Dmitri Kilin, Ph.D.
Chemnitz University of Technology, 2000
Research Area: Computational Chemistry of Materials, Theoretical Physical Chemistry

Svetlana Kilina, Ph.D.
University of Washington, Seattle 2007
Los Alamos National Lab, 2007-2010
Research Area: Computational Chemistry

Alexey Leontyev, Ph.D.
University of Northern Colorado, 2015
Research Area: Chemistry Education and Assessment

Gudrun Lukat-Rodgers
Iowa State University, 1985
Postdoctoral: University of Iowa, 1985-1988
Postdoctoral: Princeton University, 1989-1003
Research Area: Bioinorganic Chemistry

James Nyachwaya, Ph.D.
University of Minnesota, 2012
Research Area: Chemistry / Discipline Based Education Research

Alexander Parent, Ph.D.
Yale University, 2013
Research Area: Inorganic/Organic Chemistry, Green Chemistry

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

Zhongyu Yang, Ph.D.
University of Pittsburgh, 2010
Research Area: Bioanalytical chemistry; Biophysics; Electron Paramagnetic Resonance Spectroscopy

Pinjing Zhao, Ph.D.
Cornell University, 2003
Postdoctoral, Yale University, 2004-2006; University of Illinois at Urbana- Champaign, 2006-2007

Research Area: Inorganic and Organometallic Chemistry

Civil and Environmental Engineering

Department Information

- **Interim Department Chair:**
  Achintya Bezbaruah, Ph.D.
- **Graduate Program Coordinator:**
  Kalpana Katti, Ph.D.
- **Department Location:**
  201 Civil and Industrial Engineering Bldg.
- **Department Phone:**
  (701) 231-7244
- **Department Web Site:**
  www.ndsu.edu/ccee/ (http://www.ndsu.edu/ccee/)
- **Application Deadline:**
  February 15 for fall admission; September 15 for spring admission
- **Credential Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

Programs

The Department of Civil, Construction and Environmental Engineering (CCEE) offers the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in civil engineering, and the Master of Science (M.S.) degree in environmental engineering. Also, the College of Engineering offers a program leading to a Ph.D. degree in engineering, in which civil engineering is an area of specialization. The department also participates in several interdisciplinary programs such as Environmental and Conservation Sciences, Materials & Nanotechnology, and Transportation and Logistics.

Specialty areas in the M.S. and Ph.D. degrees in civil engineering include construction, environmental, geotechnical, materials, structural, transportation, and water resources engineering. Other related areas are also accommodated. The academic and research foci are tailored to individual needs and interests. To complement the major area of study, additional courses are often selected from other disciplines. The programs are designed to advance the technical knowledge, competence, and interdisciplinary understanding of the students and to prepare them for entering or advancing within the civil engineering profession.

Application to the Civil Engineering and Environmental Engineering programs 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 based on 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 English test results for international applicants) must be submitted to the Graduate School.

For teaching assistantships, refer to the English tests and additional requirements for eligibility (https://catalog.ndsu.edu/graduate/admission-information/#internationalapplicantstext)

In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

The Master of Science degree is a Master's thesis option. This format emphasizes research, 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. A cumulative GPA of 3.0 or better is required. An oral defense of the research-based thesis is required.

The Doctor of Philosophy degree requires 90 credits beyond the baccalaureate degree in civil engineering with a cumulative 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 supervisory committee should be formed and a plan of study be filed by the end of first year of study. A minimum of 30 hours of additional course work chosen by the student and the supervisory 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 supervisory committee.

A comprehensive preliminary examination 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 supervisory committee may be completed by the student. The student will defend the dissertation in a final examination attended by the supervisory committee members and other academics.

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 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

Surya Congress, Ph.D.
University of Texas at Arlington, 2018
Research Interests: Transportation Infrastructure, Design and Stabilization of Geo-Materials, Sustainable and Resilient Infrastructure Design and Monitoring, Site Characterization and Visualization Models, Slope Stabilization, Dam and Bridge Inspections, Airport Pavement Inspections, Artificial Intelligence, Image Analysis, Digital Twins, Disaster Response, Traffic Safety, and Smart City Concepts.

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

Syeed Md Iskander, Ph.D.
Virginia Polytechnic Institute and State University, 2019
Research Interests: Sustainable Waste Management: Food Waste Treatment, Landfill Leachate Treatment, Environmental Health: Disinfection Byproducts, Antibiotic Resistance Genes, Microplastics, Water-Energy Nexus: Desalination, Membrane Fabrication, Advanced Oxidation, Environmental Biotechnology: Anaerobic Biotechnology, Bioelectrochemical Systems

Dinesh Katti, Ph.D., P.E.
University of Arizona, 1991
Research Interests: Geotechnical Engineering, Constitutive Modeling of Geologic Materials, Expansive Soils, Multiscale Modeling, Steered Molecular Dynamics, Computational Mechanics, Nanocomposite, and Bio-nanocomposites. Computational Biophysics

Kalpana Katti, Ph.D.
(Graduate Coordinator)
University of Washington, 1996
Research Interests: Advanced Composites, Nanomaterials, Biomaterials, Biomimetics, Materials Characterization and Modeling, Analytical Electron Microscopy, and Microspectroscopy, Bone Tissue engineering

Trung B. Le, Ph.D.
University of Minnesota
Research Interests: Hydraulics, Fluid Mechanics, Numerical Methods for Fluid-Structure Interaction

Zhibin Lin, Ph.D., P.E.
University of Wisconsin, 2010
Research Interests: Advanced Materials, High-Performance, Resilient and Sustainable Bridge Systems, Structural Durability and Structural Health Monitoring in Bridges and Earthquake Engineering

Kelly Rusch, Ph.D., P.E.
Louisiana State University, 1992
Research Interests: Microbial System Design and Modeling, Biofuels and Bioproducts, Engineering Education Research, Aquaculture Engineering, and Water and Wastewater Treatment.

David R. Steward, Ph.D., P.E., PG, F.ASCE
University of Minnesota

Research Interests: Engineering Mathematical and Computational Methods, Groundwater Flow and Analysis, Interdisciplinary Water Resources: Water and Society

Wenjie Xia, Ph.D.
Northwestern University, 2016
Research Interests: Multiscale Modeling of Structural Materials, Polymer and Nanocomposites, Granular and Soft Matters, Bioinspired Materials, Mechanobiology, Computational Mechanics, Data-Enabled Design of Multifunctional Materials

Jiale Xu, Ph.D.
State University of New York at Buffalo, 2020
Research Interests: Wastewater and Water Treatment, Wastewater Reuse, Photochemical Processes, Electrochemical and Membrane Technologies, and Disinfection Byproducts

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

Adjunct & Emeritus

Ravi Kiran Yellavajjala, Ph.D. P.E. (adjunct)
University of Notre Dame, 2014
Interests: Experimental and Theoretical Mechanics, Constitutive Modeling of Materials, Numerical Methods, Sensitivity Analysis of Structural Response, Forensic Failure Analysis and Advanced Visualization Techniques.

Eakalak Khan, Ph.D. (adjunct)
University of California, Los Angeles, 1997
Research Interests: Water and Wastewater Quality, Water and Wastewater Treatment, and Storm Water and Non-point Source Pollution

Denver D. Tolliver, Ph.D. (adjunct)
Virginia Polytechnic University, 1989
Research Interests: Transportation, Planning and Economics

Robert Zimmerman, Ph.D. (adjunct)
North Dakota State University, 1991
Research Interests: Water and Wastewater Treatment, Solid Waste

G. Padmanabhan, Ph.D. (emeritus)
Purdue University, 1980
Research Interests: Stochastic Hydrology, Water Resource Systems, and Hydrologic Modeling

Coatings & Polymeric Materials

Department Information

- **Department Chair:**
  Dean C. Webster, Ph.D.
- **Department Location:**
  Research I, Research Park
- **Department Phone:**
  (701) 231-7633
- **Department Web Site:**
  www.ndsu.edu/cpm/ (http://www.ndsu.edu/cpm/)
- **Application Deadline:**
  April 15 is the priority deadline for fall consideration. Applications are reviewed on a rolling basis.
- **Credential Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

The Department of Coatings and Polymeric Materials offers graduate studies leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in coatings and polymeric materials. Departmental research bridges between basic and applied research in the field of polymers and coatings.

There is a unique atmosphere and opportunities for cross-disciplinary research experience, often accomplished by multi-disciplinary research activities with, for example, chemistry or engineering departments. Advanced research work involves specialized training in the following areas: colloidal and interfacial chemistry of polymers and coatings, polymer synthesis, adhesion, durability, spectroscopy, corrosion, electrochemistry, nanomaterials design and synthesis, computational modeling, life cycle assessment, and rheology. The department has an industrial advisory board consisting of leading industrial scientists and/or former graduates who provide new directions and other feedback to the program.

Research Facilities and Equipment

The Department of Coatings and Polymeric Materials is housed in a modern building in the North Dakota State University (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 and materials 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, thermal analysis, high-performance computing and NMR laboratories, are readily available to all researchers on the NDSU campus and in the NDSU Research and Technology Park.

The Department of Coatings and Polymeric Materials graduate program is open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing status to the program, the applicant must meet the Graduate School admission requirements and have adequate preparation in a science or engineering field.

Financial Assistance

The student must first be accepted in full or conditional status to be eligible for an assistantship in the Department of Coatings and Polymeric Materials. To be considered for an assistantship, the Graduate School application packet must be complete no later than April 15. International students must also submit a TOEFL or IELTS score. General and subject GRE scores are highly encouraged if they are available to the student. Graduate students may be supported during both the academic year and summer months by either teaching or research assistantships.

The current monthly stipend is $1,750+ per month, for an annual stipend of $21,000+. In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

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.

Eugene B. Caldona, Ph.D.
University of the Philippines Diliman, 2015
Mississippi State University, 2020
Research Interests: Corrosion-Preventing Materials, Electrochemistry and Surface Chemistry, Additively Manufactured Polymeric Materials, Polymer Nanocomposites, Fluoropolymers, Elastomer-Enhanced Thermosets, Thin Films, Biobased Materials, and Stimuli-Responsive and Super Liquid-Repellent Coatings

Erik Hobbie, Ph.D.
University of Minnesota, 1990
Research Interests: Nanotechnology, Nanoparticles Polymers, Optics and Rheology

Mohiuddin Quadir, Ph.D.
Freie University Berlin, 2010

Research Interest: Organic Polymer Chemistry, Functional self-assembly of polymers, Biomaterials, Application-guided modification of polymers for pharmaceutical and medical use, Bio-based materials

Xiaoning Qi, Ph.D.
North Dakota State University, 2009
Research Interests: Corrosion Characterization and Prevention, Coating Design and Formulation, Sustainable Coating Solutions, Bridge Coatings, High Temperature Coatings, Durable Functional Surfaces, and Repairable/Healable Coatings.

Bakhtiyor Rasulev, Ph.D.
Uzbek Academy of Science, 2002
Research Interests: Cheminformatics, Computational Chemistry of Polymers and Coating Materials, Quantitative Structure-Activity Relationship, Predictive Models Development, Molecular Modeling, Nanoparticles, Physico-Chemical Properties and Toxicity Assessment

Andriy Voronov, Ph.D.
Lviv Polytechnic National University, 1994
Research Interests: Polymer Synthesis, Micellar Self-Assembly, Sustainable Biobased Polymeric Materials, Responsive Polymers for Biomedical Applications, Polymers for Biomimetic Conversion of Biomass, Polymer Latexes, Polymer Hydrogels, Polymer Thin Films.

Dean Webster, Ph.D.
Virginia Polytechnic Institute and State University, 1984
Research Interests: Polymer Synthesis, Thermosets, Polymerization Reactions, Bio-based materials, Marine Coatings, Combinatorial and High Throughput Methods.

Adjunct Faculty

Dante Battocchi, Ph.D.
University of Trento, 2001
North Dakota State University, 2012
Research Interests: Electrochemical Noise Measurements, Scanning Vibrating Electrode Technique (Svet), Organic Metal-Rich Primers Characterization and Development, Materials Protection and Metal Corrosion

Bret Chisholm, (Bridgestone-Firestone)
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

Victoria Gelling, Ph.D. (Sherwin-Williams)
North Dakota State University, 2002
Research Interests: Electrochemistry, Corrosion, Environmentally Compliant Corrosion Inhibitors

Ghasideh Pourhashem, Ph.D.
Drexel University, 2014
Research Interests: Environmental impact assessment to inform decision making, Life cycle assessment (LCA) and techno-economic analysis (TEA) of bio-based products, Industrial Ecology, bio-based product policy

Brian S. Skerry, Ph.D.
University of Manchester, 1980
Research Interests: Corrosion and Coatings

Emeritus Faculty

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

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

College Teaching Certificate

Department Information

- **Program Director:**
  Stacy Duffield, Ph.D.
- **Department Location:**
  FLC 314, Office of Teaching and Learning
- **Department Phone:**
  (701) 231-7015
- **Department Web Site:**
  www.ndsu.edu/otl/programs/college_teaching_certificate/ (http://www.ndsu.edu/otl/programs/college_teaching_certificate/)
- **Credential Offered:**
  Certificate

The College Teaching Certificate is a three-semester (nine-credit) graduate certificate in pedagogy. Students study contemporary education research and gain experience in the teaching and learning process through microteaching modules, field experience, peer observations, and a structured practicum.

Admission Requirements

Current graduate students may apply to the program by submitting College Teaching Certificate Application (https://na3.docusign.net/Member/PowerFormSigning.aspx?PowerFormId=638d34cb-d97f-4057-9ac1-1efdd67656b3&env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&v=2) and paying the $35 application fee.

Students not currently in a graduate program 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.
3. Submit a completed application (https://www.ndsu.edu/gradschool/apply/certificate/) to the Graduate School. If you are an NDSU employee and are not currently a graduate student, you must complete a non-degree admission application (https://www.ndsu.edu/gradschool/apply/non_degree/).
4. Submit a completed College Teaching Certificate Application (https://na3.docusign.net/Member/PowerFormSigning.aspx?PowerFormId=638d34cb-d97f-4057-9ac1-1efdd67656b3&env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&v=2) to the Graduate School.

Course Requirements

Code	Title	Credits
The College Teaching Certificate is a three-semester, 9 credit program		
Foundation Courses (choose one)		**3**
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences (Fall, annually)	
ENGL 764	Teaching Workshop for Writing Instructors	
HDFS 802	Teaching and Learning in the Human Sciences (Spring, every odd year)	
STEM 810	Teaching College Science (Fall, annually)	
Electives (choose one)		**3**
COMM 712	Emerging Trends in Teaching and Learning Online	
EDUC 728	Instructional Technology for Teaching and Learning	
EDUC 753	Managing/ and Monitoring Learning (Spring, annually)	
EDUC 853	Instructional Methods for Adult Learners	
H&CE 743	Experiential and Learner-Centered Instruction	
STEM 820	STEM Curriculum and Instruction (Spring, every even year)	
STEM 840	Designing Technology-infused Learning Environments in Higher Education	
Required Teaching Practicum		**3**
792 or 892 in your home department		
Total Credits		**9**

The teaching practicum requires a minimum of 15 teaching hours, with the remaining credit hours to be dedicated to preparing lesson plans, evaluating student data, and developing assessments. The field experience will be designed in consultation with their department and a faculty teaching mentor.

Students will complete a field experience form for approval from the program director during the semester prior to the experience to ensure the practicum meets certificate program requirements.

Notes:

1. This schedule is subject to change.
2. Every course has an enrollment cap. Please check with the individual course instructors.
3. **Once requirements are completed a student must submit the** Graduation Application **(**https://powerforms.docusign.net/71b00c0e-af21-4473-bb23-cdbd85983676/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7**) form. Certificate students are not required to pay the $25 processing fee.**

Communication

Department Information

- **Department Chair:**
  Stephenson Beck, Ph.D.
- **Graduate Coordinator:**
  Justin Walden, Ph.D.
- **Department Location:**
  Minard Hall 338
- **Department Phone:**
  (701) 231-7705
- **Department Web Site:**
  www.ndsu.edu/communication/ (http://www.ndsu.edu/communication/)
- **Application Deadline:**
  For full consideration, applications must be completed by Feb. 15 for fall semester
- **Credential Offered:**
  Ph.D., M.A.
- **Test Requirement:**
  GRE or additional writing sample
- **English Proficiency Requirements:**
  TOEFL ibT 100, IELTS 7 for admission; TOEFL ibT 100, IELTS 7 for teaching assistantship; Duolingo 125

The graduate program in communication offers graduate study leading to the Master of Arts (M.A.) and Doctor of Philosophy (Ph.D.) degrees. The program prepares students for academic and management positions, as well as advancement within current career fields.

The department tailors student research projects and academic programs to individual needs and interests. Students may take interdisciplinary graduate course work to enhance their program of study. Information is available on the department's website, www.ndsu.edu/communication (https://www.ndsu.edu/communication/).

Admission Requirements

Programs are open to students holding baccalaureate degrees from accredited universities or colleges.

Master of Arts

To be admitted with full status to the program, the applicant must meet the Graduate School requirements; have adequate study in communication, journalism or a related area; and provide a score for the Graduate Record Examination (GRE).

Doctor of Philosophy

To be admitted with full status to the program, the applicant must meet the Graduate School requirements. In addition to materials required by the Graduate School applicants must submit:

- A CV or resume which clearly identifies your current position, including your responsibilities, your professional publications and papers, your service and professional activity, and your teaching and training experiences.
- A scholarly writing sample where the candidate is first author (single authorship preferred), such as a master's thesis, proposal, or chapter, a conference paper, or a final course paper.
- Evidence of effective teaching **potential** (please include one or more of the following): teaching evaluations, teaching philosophy statement, recommendation letter(s) that speak to experience or potential of applicant, peer evaluations/observations, sample syllabi, sample lesson plan/assignment, etc.

- Graduate Record Examination (GRE) scores.
- TOEFL test results (required for international students).

Financial Assistance

Students admitted at full or conditional status will be considered for teaching assistantships at the master's or doctoral degree level, based on the strength of their application materials. Initially, teaching assistants conduct lab sessions for the COMM 110 Fundamentals of Public Speakingclass. Teaching assistants may have opportunities to teach other classes during their program.

In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

Master of Arts Program

The Master of Arts program is designed for students who are interested in conducting quantitative, qualitative, or humanistic/rhetorical research. The program requires completion of 30 credit hours of graduate coursework with an overall GPA of 3.0 or better. The student can elect to complete a research-based thesis, for which six of the 30 credits are awarded, or a written examination, for which three credits are awarded. A prospectus meeting and final defense of the thesis/written examination is required.

Code	Title	Credits
Core		
COMM 700	Research Methods in Communication	3
COMM 711	Communication Theory	3
Research Tools		
Select at least two of the following:		6
COMM 704	Qualitative Research Methods in Communication	
COMM 707	Quantitative Research Methods in Communication	
COMM 767	Rhetorical Criticism	
SOC 700	Qualitative Methods	
SOC 701	Quantitative Methods	
STAT 725	Applied Statistics	
Elective Specialization		**12-15**
Thesis Option - minimum of 12; Examination Option - minimum of 15		12-15
Students may also choose graduate-level electives from other departments that may enhance specialized communication study goals.		
Thesis or Examination (Thesis Option - 6 credits; Examination Option - 3 credits		**3-6**
COMM 798	Master's Thesis	
or COMM 799	Master's Examination	
Total Credits		**30**

Doctor of Philosophy

The Ph.D. program is designed to be completed in four (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 supervisory committee.

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 Summer Scholar courses.

Course Requirements

Minimum of 60 credit hours in core or content concentration:

Code	Title	Credits
Core Courses		
COMM 700	Research Methods in Communication	3
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	3

COMM 711	Communication Theory	3
COMM 735	Theories of Media, Technology, and Society (or organizational communication theory course)	3
or COMM 783	Advanced Organizational Communication I	
Content Concentration		
COMM 700-level courses in the student's major concentration area		12
COMM 700-level courses in the student's minor concentration area		9
Research Methods Courses		**12**
Exclusive of COMM 700. Maximum of 6 credit hours of independent study		
Dissertation		**15**
COMM 899	Doctoral Dissertation	

Preliminary Examination

When coursework is nearly completed, the Director of Graduate Studies will consider the program of study and student's professional presentations and publications to determine readiness for the preliminary examination process. Doctoral students will meet with their advisers to prepare for the preliminary 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 examination.

Dissertation

Under the guidance of an adviser and advisory committee, doctoral candidates will submit and defend a dissertation prospectus and ultimately a completed dissertation.

Stephenson J. Beck, Ph.D.
University of Kansas, 2008
Research Interests: Group and Organizational Communication, Interaction Analysis, Communication Strategy

Ross F. Collins, Ph.D.
University of Cambridge, 1992
Research Interests: Media History, International Media

Shuning Lu, Ph.D.
University of Texas at Austin, 2019
Research Interests: Mass Communication, Digital Journalism

Zoltan Majdik, Ph.D.
University of Southern California , 2008
Research Interests: Rhetoric, Computational Study of Language, Digital Humanities

Carrie Anne Platt, Ph.D.
University of Southern California, 2008
Research Interests: Rhetoric of Cultural Politics, Gender and Technology, Media in Society

Melissa A. Vosen Callens, Ph.D.
North Dakota State University, 2010
Research Interests: Online Pedagogy, Emerging Media and Classroom Technology, Representations of Race and Gender in Popular Culture

Justin A. Walden, Ph.D.
Pennsylvania State University, 2013
Research Interests: Organizational Communication, Organizational and Individual Technology Adoption, Employee/Brand Advocacy

Catherine Kingsley Westerman, Ph.D.
Michigan State University, 2008
Research Interests: Organizational Communication, Workplace Friendships

David Westerman, Ph.D.
Michigan State University, 2007
Research Interests: Computer Mediated Communication, Interpersonal Communication

Cheng Zeng, Ph.D.
University of Jyvaskyla, Finland, 2018

Research Interests: Organizational Communication

Emeritus

Ann Burnett, Ph.D., Professor Emerita
Robert S. Littlefield, Ph.D., Professor Emeritus
Paul E. Nelson, Ph.D., Professor Emeritus
Charles Okigbo, Ph.D., Professor Emeritus
Judy C. Pearson, Ph.D., Professor Emerita
Gerald A. Richardson, M.A., Professor Emeritus
Lou Richardson, M.S., Professor Emerita

Community Development

Department Information

- **Program Coordinator:**
  Christina Weber, Ph.D.
- **Email:**
  christina.d.weber@ndsu.edu
- **Department Location:**
  Minard 428
- **Department Phone:**
  (701) 231-7637
- **Department Web Site:**
  www.ndsu.edu/socanth/ (http://www.ndsu.edu/socanth/)
- **Application Deadline:**
  Applications must be received by February 15 for fall semester and September 15 for spring semester.
- **Credential Offered:**
  M.A., M.S., Certificate
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

The Department of Sociology and Anthropology offers a 36 credit hour Master of Science (M.S.) or Master of Arts (M.A.) in Community Development and a 12 credit hour graduate certificate in Community Development. The degree is a multi-institutional, multi-disciplinary, online program in conjunction with the Interactive Distance Education Alliance (IDEA) (https://www.gpidea.org/). Other institutions participating in this program include Kansas State University, the University of Nebraska-Lincoln, and South Dakota State University.

The primary audience for this program is community economic development officials, community leaders, specialists already employed in the field and for those committed .

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.

Certificate Requirements

Code	Title	Credits
Required Courses		
CED 711	Principles and Strategies of Community Change	3
CED 713	Community Development II: Organizing for Community Change	3
Electives		**6**
CED 709	Foundations in Community Development	

CED 715	Community Analysis: Introduction to Methods
CED 717	Community and Regional Economic Policy and Analysis
CED 719	Community Natural Resource Management
CED 721	Introduction to Native Community Development
CED 723	Building Native Community/Economic Capacity
CED 731	Ecological Economics
CED 733	Sustainable Communities
CED 741	Economic Development Strategies and Programs
CED 745	Land Management Planning
CED 752	Basic Grant Development and Management
CED 753	Not-for-profit Management
CED 755	Community Leadership and Capacity Building
CED 756	Community Engagement
CED 758	Evaluation of Organizations and Programs
CED 761	Government, Politics, & Community Development
CED 763	Immigrants and Communities
Total Credits	**12**

Master's Degree Requirements

Masters students will write a master's thesis (Plan A), complete a comprehensive study (Plan B), or pursue a culminating experience (Plan C). The student's schedule of courses must be approved by the faculty advisor.

Code	Title	Credits
Core Courses Credits		18
CED 709	Foundations in Community Development	
CED 711	Principles and Strategies of Community Change	
CED 713	Community Development II: Organizing for Community Change	
CED 715	Community Analysis: Introduction to Methods	
CED 717	Community and Regional Economic Policy and Analysis	
CED 719	Community Natural Resource Management	
Electives		**12-18**
CED 752	Basic Grant Development and Management	3
CED 721	Introduction to Native Community Development	3
CED 723	Building Native Community/Economic Capacity	3
CED 733	Sustainable Communities	3
CED 741	Economic Development Strategies and Programs	3
CED 745	Land Management Planning	3
CED 761	Government, Politics, & Community Development	3
CED 753	Not-for-profit Management	3
CED 755	Community Leadership and Capacity Building	3
CED 763	Immigrants and Communities	3
CED 758	Evaluation of Organizations and Programs	3
CED 756	Community Engagement	3
CED 746 HOUSING AND DEVELOPMENT PROGRAMS		3
Plan A or B option		
CED 798	Master's Thesis	
or CED 797	Master's Paper	
Plan C		

The Plan C option requires 36 credits of coursework only.

Community Planning & Resilience

Department Information

- **Department Chair:**
  Dominic L. Fischer, MLA, PLA
- **Department Location:**
  Klai Hall
- **Department Phone:**
  (701) 231-6151
- **Credential Offered:**
  M.S.

The Community Planning & Resilience degree offers students the opportunity to focus on the concepts of resilience and planning from an interdisciplinary perspective. The program includes instruction in disaster management, landscape architecture, city and regional planning, geographic information systems (GIS), and sustainable development. Students will be prepared to identify shocks and stressors that can influence communities, create strategies/approaches to address these complex urban challenges, and bring together the necessary stakeholders and funding opportunities to implement strategies.

Degree Requirements

Code	Title	Credits
Required Courses		**16**
DREM 610	Comprehensive Emergency Management Planning	
DREM 613	Disaster Mitigation	
or DREM 683	Disaster Recovery	
DREM 720	Resilience for Designers, Planners, and Managers	
GEOG 655	Introduction to Geographic Information Systems	
LA 722	Landscape Theory, Research, + Scholarly Methods	
Electives (minimum)		**14**
ARCH 789	Professional Topics in Architecture *	
DREM 661	Business Continuity & Crisis Management	
DREM 663	Voluntary Agency Disaster Services	
DREM 790 Graduate Seminar *		
GEOG 656	Advanced Geographic Information Systems	
GEOG 665	Remote Sensing of the Environment	
GEOG 680	Geographic Information Systems Pattern Analysis and Modeling	
LA 789	Professional Topics in Landscape Architecture *	
Total Credits		**30**

*
Course may be repeated for credit.

Computer Science

Department Information

- **Department Chair:**
  Simone Ludwig, Ph.D.
- **Graduate Program Coordinator:**
  Changhui Yan, Ph.D.
- **Department Location:**
  258 QBB
- **Department Phone:**
  (701) 231-8562
- **Department Email:**

gradinfo@cs.ndsu.edu

- **Department Web Site:**
  www.ndsu.edu/cs/ (http://www.ndsu.edu/cs/)
- **Application Deadline:**
  February 1 priority deadline for fall semester; September 1 for spring semester**
- **Credential Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

Program Description

The Department of Computer Science offers the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in Computer Science. For additional information, please contact the department at (701) 231-8562 or gradinfo@cs.ndsu.edu.

In addition to the minimum Graduate School requirements, the following items are required for all Computer Science applicants seeking an advanced degree:

Master of Science

- The applicant must have a bachelor's degree from an educational institution of recognized standing. Admission to the program is competitive; the following minimum requirements are necessary but are not sufficient for automatic admission.
- The applicant must show, by a combination of educational background, academic performance, and work experience, the potential to succeed in advanced study and research in computer science. Minimum preparation usually includes the ability to program in one or more modern, commonly used high-level languages (such as Java or C++); and experience in using data structures such as linked lists and binary trees. Minimum preparation for unconditional admission to the master's program would normally include courses in computer science principles and theory equivalent to the NDSU courses.

Code	Title	Credits
CSCI 161	Computer Science II	4
CSCI 222	Discrete Mathematics	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3

- Applicants to the Computer Science M.S. program must have a cumulative grade point average (CGPA) 3.0 (out of 4.0) or higher in all previous courses to be admitted full standing.
- GRE score is not required for admission. However, a GRE score above the median (50th percentile) for the quantitative reasoning portion is strongly recommended for gaining priority in assistantships.
- International applicants are welcome. International students from some countries are exempt from English proficiency examination requirement (See details at https://www.ndsu.edu/gradschool/apply/international). Others must submit TOEFL, IELTS, PTE Academic score or Duolingo 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 or
  - Duolingo score of 105.
- Eligibility for a teaching assistantship/tutor requires the following additional requirements:
  - minimum TOEFL ibT score of 81 (IELTS of 7, PTE of 54, Duolingo of 115)
    - TOEFL ibT Speaking subscale score of 23 or above and
    - TOEFL ibT Writing subscale score of 21 or above.
  - IELTS equivalent scores are 6.0 and 6.0, respectively.
  - PTE Academic equivalent scores are 62 and 56, respectively
  - Duolingo score is 115 or greater.
- The eligibility for a grader requires
  - minimum TOEFL ibT score of 79 (IELTS of 6.5, PTE of 54, Duolingo of 115)
    - must score at or above the 40th percentile on the TOEFL ibT Speaking and Writing subscales (currently 19 and 21 respectively)
  - IELTS equivalent scores are 5.5 and 6.0 respectively

- PTE Academic equivalent scores are 51 and 56, respectively
- Duolingo is 110 or greater.

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. GRE score is not required for admission. However, a GRE score above the median (50th percentile) for the quantitative reasoning portion is strongly recommended for gaining priority in assistantships. The admissions committee will evaluate the applicant's overall academic record, as well as any relevant employment and professional experience. Of particular importance is evidence of the applicant's potential for scholarship and independent research at the Ph.D. level. International students are welcome. English Language requirements are the same as for the Computer Science M.S. program.

The graduate admissions committee reviews all applications during the month following the application deadline and considers accepted students for any available assistantship positions within the department. If an assistantship is not offered at time of admission, accepted students can then fill out an application on the Computer Science website for later consideration.

Financial Assistance

Assistantships are available to selected graduate students. Teaching one section of a lower division service course requires 10 hours of work per week and qualifies the student for a monthly stipend. In addition to the stipend, graduate assistants with a 20 hours/week assistantship receive a full graduate tuition waiver. Graduate assistants with an assistantship that is less than 20 hours/week but at least 10 hours/week receive a 50% graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

Other assistantships that provide a stipend and tuition waiver include research assistantships, which involve assisting faculty with their research, and graduate service assistantships, which involve tutoring, grading or computer-related work with faculty members or organizations on campus. Related prior experience increases the likelihood of a teaching or tutoring assistantship being awarded. For all assistantships, a student's chances are greater after they have been at NDSU one or two semesters.

Code	Title	Credits
Master of Science in Computer Science Degree Requirements		
Core courses (required of all students):		
CSCI 713	Software Development Processes	3
CSCI 724	Survey of Artificial Intelligence	3
CSCI 741	Algorithm Analysis	3
CSCI 765	Introduction to Database Systems	3
Additional 600-800 level Computer Science courses selected in consultation with your adviser.		
Thesis Option (Plan A)		**32**
Additional graduate coursework		8-12
CSCI 790	Graduate Seminar	2
CSCI 798	Master's Thesis	6-10
Comprehensive Study Option (Plan B)		**32**
Additional Graduate Coursework		14-16
CSCI 790	Graduate Seminar	2
CSCI 797	Master's Paper	2-4
Culminating Experience-Based Option (Plan C)		**36**
Additional Graduate Coursework		24

Additional requirements for the Master of Science in Computer Science program:

- Research advisor should be selected by the end of the second semester at NDSU.
- Additional 600-800 level Computer Science courses selected in consultation with your advisor
  - maximum of two courses (6 credits) at the 600 level
  - Field Experience/Practicum credits do not count.
- Courses on topics that are typically considered to be part of computer science, such as AI, machine learning, software engineering, etc. should be taken in the Computer Science Department. Outside courses (courses without a CSCI prefix) need prior approval by the graduate coordinator and

the research advisor and should only be approved if a course with similar content is not already offered by our department. A syllabus might need to be submitted by the student wanting to take a particular course from another department to ensure adequate coverage of computer science content.

- All course work must be approved by the student's advisor, supervisory committee, and graduate coordinator through the Plan of Study.
- A Plan of Study listing coursework and examination committee members should be completed by the end of the second semester at NDSU.
- A maximum of 9 credits may be transferred into the program.
- There may be a maximum of 3 credits of independent study.
- Successful completion of the final oral examination on the student's research for Plan A Thesis Option and Plan B Master's Paper Option

Code	Title	Credits
Bachelor's to Doctor of Philosophy in Computer Science degree requirements		**90**
Core Courses: (or their equivalent in transfer or examination credits)		15
CSCI 713	Software Development Processes	
CSCI 724	Survey of Artificial Intelligence	
CSCI 741	Algorithm Analysis	
CSCI 765	Introduction to Database Systems	
CSCI 790	Graduate Seminar	
8-13 additional courses selected in consultation with your adviser.		24-39
CSCI 899	Doctoral Dissertation	36-51

Code	Title	Credits
Master's to Doctor of Philosophy in Computer Science degree requirements		**60**
Core Courses: (or their equivalent in transfer or examination credits)		15
CSCI 713	Software Development Processes	
CSCI 724	Survey of Artificial Intelligence	
CSCI 741	Algorithm Analysis	
CSCI 765	Introduction to Database Systems	
CSCI 790	Graduate Seminar	
3-5 additional courses selected in consultation with your adviser.		9-15
CSCI 899	Doctoral Dissertation	30-36

Code	Title	Credits
Doctor of Philosophy + Master of Science in Computer Science degree requirements		**90**
Core Courses: (or their equivalent in transfer or examination credits)		15
CSCI 713	Software Development Processes	
CSCI 724	Survey of Artificial Intelligence	
CSCI 741	Algorithm Analysis	
CSCI 765	Introduction to Database Systems	
CSCI 790	Graduate Seminar	
8-13 additional courses selected in consultation with your adviser.		24-39
CSCI 899	Doctoral Dissertation	36-51

Additional requirements for the Bachelor's to Doctor of Philosophy and Master's to Doctor of Philosophy options:

- Research advisor should be selected by the second semester at NDSU.
- A minimum of 15 didactic credits numbered 700 -789 or 800-898,
  - at least 9 are not included in the Computer Science core courses listed above
  - none of these can be individual study course credits.
- A maximum of two courses (6 credits) at the 600 level; Field Experience/Practicum credits do not count.
- Students who took core courses as part of their M.S. studies at NDSU should discuss replacement courses with the advisor and the Graduate program coordinator.

- Courses on topics that are typically considered to be part of computer science, such as AI, machine learning, software engineering, etc. should be taken in the Computer Science Department. Outside courses (courses without a CSCI prefix) need prior approval by the graduate coordinator and the research advisor and should only be approved if a course with similar content is not already offered by our department. A syllabus might need to be submitted by the student wanting to take a particular course from another department to ensure adequate coverage of computer science content.
- All course work must be approved by the student's advisor, supervisory committee, and graduate coordinator through the plan of study.
- A Plan of Study listing coursework and supervisory committee members should be completed by the end of the second semester at NDSU.
- 30-51 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.
- Students who applied the listed core courses towards a M.S. degree obtained from NDSU can take up to 42 research credits.
- Satisfactory completion of the comprehensive examination at the Ph.D. level (written exam based on the core courses).
- Research proposal presentation and preliminary oral examination (Qualifying Exam) should be completed by the fourth semester at NDSU after passing the comprehensive exam.
- Successful completion of the final defense of 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 if the M.S. degree is in Computer Science **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 if the M.S. degree is not in Computer Science.
- The 90 credits (including any credits transferred) must be computing-related with at least 39 credits involving significant graduate level computer science material, which are offered by a computer science department.
- The 90 credits may include a maximum of 6 credits of non-didactic courses (independent studies or seminars). Seminars are limited to 3 of those credits.

Additional requirements for the Doctor of Philosophy + Master of Science option (Effective starting Fall 2024):

- Ph.D. students in this option will earn a Master of Science degree after they pass the preliminary oral examination (Qualifying Exam).
- Students will need to submit a Ph.D. Plan of Study indicating "Ph.D. + Master's" as the degree.
- Before a student can apply to take the preliminary oral examination (Qualifying Exam), they must have

    1. passed the comprehensive exam.
    2. completed 30 credits, of which 21 credits need to be didactic credits at the graduate level at NDSU.
    3. submitted a paper as first author to a high-quality journal or conference on a topic related to their Ph.D. dissertation.

- After students have passed the preliminary examination, they must complete the Graduate School Graduation Application (https://powerforms.docusign.net/71b00c0e-af21-4473-bb23-cdbd85983676/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) in order for their M.S. degree to be posted to their academic record.
- Students will be eligible to participate in commencement of their M.S. degree the term they pass the preliminary oral examination (Qualifying Exam).
- Research advisor should be selected by the second semester at NDSU.
- A minimum of 15 didactic credits numbered 700 -789 or 800-898,
  - at least 9 are not included in the Computer Science core courses listed above
  - none of these can be individual study course credits.
- A maximum of two courses (6 credits) at the 600 level; Field Experience/Practicum credits do not count.
- All course work must be approved by the student's advisor, supervisory committee, and graduate coordinator through the plan of study.
- A Plan of Study listing coursework and supervisory committee members should be completed by the end of the second semester at NDSU.
- 30-51 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.
- Satisfactory completion of the comprehensive examination at the Ph.D. level (written exam based on the core courses).
- Successful completion of the final defense of the dissertation.

Zahid Anwar, Ph.D.
University of Illinois at Urbana-Champaign, 2008
Research Interests: Cybersecurity Policy and Law, Artificial Intelligence and Machine Learning

Anne Denton, Ph.D.
University of Mainz, 1996

Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Databases, Geospatial Data, Cloud Computing

Ajay Jha, Ph.D.
Kyungpook National University, 2017
Research Interests: Software Engineering, Software Testing and Maintenance

Jun Kong, Ph.D.
University of Texas, Dallas, 2005
Research Interests: Human Computer Interaction, Mobile Computing, Software Engineering

Pratap Kotala, Ph.D.
North Dakota State University, 2015
Research Interests: Software Engineering

Juan (Jen) Li, Ph.D.
University of British Columbia, 2008
Research Interests: Smart and Connected Health, Semantic Web Technologies, Internet of Things (IoT)

Lu Liu, Ph.D.
University of Texas San Antonio, 2017
Research Interests: Bioinformatics, Data Mining, Machine Learning, Data Science

Simone Ludwig, Ph.D.
Brunel University, 2004
Research Interests: Swarm Intelligence, Evolutionary Computation, Deep Neural Networks, Fuzzy Reasoning, Machine Learning

Kenneth Magel, Ph.D.
Brown University, 1977
Research Interests: Software Engineering, Human-Computer Interfaces, Software Complexity, and Software Design

M. Zubair Malik, Ph.D.
University of Texas at Austin, 2014
Research Interests: Program Analysis, Automated Program Repair, Secure Software Development, Software Verification-Validation and Testing, Software Systems (especially large scale Distributed Systems for Data science and Machine Learning), Formal Methods, Application of Artificial Intelligence in Program Analysis

Oksana Myronovych, Ph.D.
North Dakota State University, 2009
Research Interests: Software Engineering

Saeed Salem, Ph.D.
Rensselaer Polytechnic Institute, 2009
Research Interests: Bioinformatics, Machine Learning and Data Mining

Jeremy Straub, Ph.D.
University of North Dakota, 2015
Research Interests: Multi-tier Mission Architecture & Control, Autonomous Data Link Reduction, Autonomous Vehicle Control, Machine Vision, Super Resolution

Vasant Ubhaya, Ph.D.
University of California-Berkeley, 1971
Research Interests: Algorithm Analysis, Approximation and Optimization

Changhui Yan, Ph.D.
Iowa State University, 2005
Research Interests: Bioinformatics, Computational Biology, Genomics, Machine Learning, Data Mining, Big Data, Cloud Computing

Computer Science Education

Department Information

- **Department Head:**
  Simone Ludwig, Ph.D.
- **Graduate Program Coordinator:**
  Changhui Yan, Ph.D.

- **Department Location:**
  258 QBB
- **Department Phone:**
  (701) 231-8562
- **Department Email:**
  gradinfo@cs.ndsu.edu
- **Department Web Site:**
  cs.ndsu.edu/ (http://cs.ndsu.edu/)
- **Credential Offered:**
  Certificate
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

This certificate is primarily aimed at high school teachers in need of credentials to teach "dual credit" courses in their schools as well as AP Computer Science instructors. The courses are all online, taught in a condensed / hybrid format, and offered all year round.

The graduate certificate in Computer Science Education is comprised of six 3-credit courses for a total requirement of eighteen credits, aimed at preparing for teaching high school Computer Science. The courses are selected for their content which covers the essential, core concepts of Computer Science, and how to teach them.

Program Objectives:

The Graduate Certificate Program in Computer Science Education focuses on the following:

1. Fundamental topics providing a broad background in Computer Science.
2. Allowing students from varied backgrounds and different points in their working career to enter the program with a minimum of pre-requisite work.
3. Allowing students currently pursuing advanced degrees in computing related disciplines to join the program and readily add the Graduate Certificate to their credentials.
4. Providing the necessary 18 credit hours for high school teaching credentials while presenting a course offering schedule to allow students to complete the program in fifteen months.
5. Making maximum use of existing department resources at NDSU to support delivery of the program.
6. Gaining a broad background and knowledge in Computer Science Education through a fixed set of core courses.

Certificate Requirements

Course requirements may be found on the Computer Science department website (https://www.ndsu.edu/cs/current_students/graduate_programs/graduate_certificate_in_computer_science_education/).

Construction Management

Department Information

- **Interim Department Chair:**
  Achintya Bezbaruah, Ph.D.
- **Graduate Coordinator:**
  Kalpana Katti, Ph.D.
- **Department Location:**
  Engineering 106
- **Department Phone:**
  (701) 231-7244
- **Department Web Site:**
  www.ndsu.edu/ccee/ (http://www.ndsu.edu/ccee/)
- **Application Deadline:**
  Fall: May 1; Spring: October 1 for M.S. and Master of Construction Management, November 1 for Certificate
- **Credential Offered:**
  MSCM, MCM, Graduate Certificate
- **Test Requirement:**
  GRE (M.S. applicants)
- **English Proficiency Requirements:**

M.S.: TOEFL ibT: 81, IELTS: 7, PTE Academic 54, Duolingo 105; Master of Construction Management: TOEFL iBT: 79, IELTS: 6.5, PTE Academic: 53, Duolingo 105

Programs

The Department of Civil, Construction and Environmental Engineering offers three separate and distinct construction management graduate programs as listed below.

Master of Science in Construction Management (MSCM)

The Master of Science in Construction Management program is an on-campus, research-focused degree. The program consists of a total of 31 credits (24 credits of course work, 6 credits of research/thesis, and 1 credit of seminar). Students are expected to significantly contribute to the development and delivery of scholarly publications and to the development and submission of research grant proposals as determined by the major adviser.

Master of Construction Management (MCM)

The Master of Construction Management program is a 100% online professional program consisting of 30 credits of course work (10 courses offered within a 12-month period) and the Associate Constructor (AC) Exam. The program provides a learning experience constituting a distinct knowledge-base and a specific set of associated skills within the areas of construction estimating, scheduling, project management, finance, safety and quality, and techniques and equipment at the professional level.

Graduate Certificate in Construction Management (CCM)

The graduate certificate in Construction Management program provides a 100% online program consisting of 9 credits of course work (3 courses offered within a 12-month period) within the areas of estimating, scheduling, and project management at the professional level. These three areas constitute a body of knowledge that represents the fundamental core of construction management.

Master of Science in Construction Management (MSCM)

In addition to the Graduate School requirements, to be admitted into the program 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 Graduate Record Examination (GRE) score.
- Submit a one-page “Statement of Purpose” outlining reasons for pursuing the Master of Science in Construction Management, emphasizing on research objectives and qualifications that directly relate to one or more of the “Research Interests” of the CM&E faculty.
- Submit a two-page resume.

Prospective students must submit application materials via the online application process.

Financial Assistance

For exceptional applicants, the CCEE Department may offer a graduate assistantship, which consists of a monetary stipend and a possible tuition waiver; however, student activity fees and program fees are not waived. There is no separate application process for graduate assistantships. Applicants are evaluated based on their credentials and/or experience.

Master of Construction Management (MCM)

In addition to the Graduate School requirements, to be admitted into the program, applicants must:

- Have earned a baccalaureate degree in construction, engineering, architecture, or other related discipline with a minimum CGPA of 3.0 or equivalent to attain full standing. Work experience in the construction industry can possibly be a substitute if degree is in another field.
- Submit a two-page resume.

Prospective students must submit application materials 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 students in the Master of Construction Management program are not eligible for assistantships or tuition waivers.

Graduate Certificate in Construction Management (CCM)

In addition to the Graduate School requirements, to be admitted into the Graduate Certificate in Construction Management applicants must:

- Have earned a baccalaureate degree in construction, engineering, architecture, or other related discipline with a minimum CGPA of 2.75 or equivalent to attain full standing. Work experience in the construction industry can possibly be a substitute if degree is in another field.
- Submit a two-page resume.

Prospective students must submit application materials via the online application process.

Financial Assistance

Graduate Certificate in Construction Management Program students are not eligible for assistantships, tuition waivers, or financial aid.

Master of Science in Construction Management (MSCM)

The M.S.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 plan of study for the M.S. in Construction Management is shown below:

Code	Title	Credits
CM&E 790	Graduate Seminar	1
CM&E 603	Scheduling and Project Control	3
CM&E 605	Construction Support Operations	3
CM&E 701	Construction Technology and Equipment	3
CM&E 711	Construction Cost Estimating	3
CM&E 712	Construction Management	3
600, 700 or 800-level electives *		9
CM&E 798	Master's Thesis	6
Total Credits		**31**

***** Electives may be any 600, 700, or 800-level courses offered at NDSU determined by the student and the major faculty adviser. A minimum cumulative grade point average (CGPA) of 3.0 must be achieved to receive the M.S. degree.

Master of Construction Management (MCM)

The Master of Construction Management degree consists of thirty (30) credits of course work and AC Examination. The following ten (10) courses constitute the thirty (30) credits of course work required for the degree.

Code	Title	Credits
CM&E 603	Scheduling and Project Control	3
CM&E 605	Construction Support Operations	3
CM&E 660	Infrastructure Management	3
CM&E 701	Construction Technology and Equipment	3
CM&E 703	Advanced Project Planning and Control	3
CM&E 711	Construction Cost Estimating	3
CM&E 712	Construction Management	3
CM&E 715	Construction Specifications and Contracts	3
CM&E 725	Decision Making and Risk Analysis	3
CM&E 740	Financial and Economic Concepts for Construction Managers	3
Total Credits		**30**

Schedule of Courses

Summer Semester
CM&E 603 Scheduling and Project Control
CM&E 660 Infrastructure Management

Fall Semester
CM&E 703 Advanced Project Planning and Control
CM&E 712 Construction Management
CM&E 715 Construction Specifications and Contracts
CM&E 740 Financial and Economic Concepts for Construction Managers

Spring Semester

CM&E 605 Construction Support Operations
CM&E 701 Construction Technology and Equipment
CM&E 711 Construction Cost Estimating
CM&E 725 Decision Making and Risk Analysis

Graduate Certificate in Construction Management (CCM)

The certificate program consists of nine credits encompassing the following three (3) courses:

Code	Title	Credits
CM&E 603	Scheduling and Project Control	3
CM&E 711	Construction Cost Estimating	3
CM&E 712	Construction Management	3
Total Credits		**9**

Only grades of C or higher will satisfy requirements for certificate completion with a CGPA of 3.0 or greater. Courses used to satisfy the Graduate Certificate requirements cannot be older than three years at the time the certificate completion is verified.

Eric Asa, Ph.D.
Associate Professor
University of Alberta, 2002
Research Interests: Infrastructure and Assets Management, Construction Materials, Engineering Education, Computational Modeling

Abdul-Aziz Banawi, Ph.D.
Assistant Professor
University of Pittsburgh, 2013
Research Interests: Life Cycle Assessment, Building Information Modeling, Building Construction - Virtual Reality, Green Buildings and Sustainability, Lean Construction and Six-Sigma

Zhili (Jerry) Gao, Ph.D., P.E., C.P.C
Associate Professor and Associate Chair
Iowa State University, 2004
Research Interests: Lean Construction, Virtual Design and Construction (Visualization, BIM Development and Implantation), Advanced Concrete Techniques (Sustainable Concrete, New Concrete Materials and Structures)

Youjin Jang, Ph.D.
Assistant Professor
Seoul National University, 2017
Research Interests: Construction Automation, Human-Robot Collaboration, Human-Building Interaction, Sustainability, Data Analytics, Data-driven Decision Making, Emerging Technologies Adoption

Chau Le, Ph.D.
Assistant Professor
Texas A&M University, 2021
Research Interests: Applications of Data Analytics and Artificial Intelligence, Alternative Contracting Methods, Sustainable and Resilient Infrastructure, Emerging Technologies and Robotics, Human Safety and Health

Yao Yu, Ph.D.
Assistant Professor
North Carolina A&T State University, 2014
Research Areas: Building Energy Conservation Technology, Computational Airflow Modeling, and HVAC System Design and Simulation

Counselor Education

Department Information

- **Graduate Coordinator:**
  Jodi Tangen, Ph.D.
- **Department Location:**
  Morril Hall 221
- **Department Web Site:**
  www.ndsu.edu/ceduc/ (http://www.ndsu.edu/ceduc/)
- **Application Deadline:**
  February 1
- **Credential Offered:**
  M.Ed., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

The Counselor Education program offers graduate study leading to a Master's of Education (M.Ed.) or a Master's of Science (M.S.) in Counseling. Accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP), the Counselor Education program prepares counselors to work professionally with persons from diverse cultural backgrounds in a variety of settings. Program specializations are available in School Counseling and in Clinical Mental Health Counseling.

The Counselor Education Program welcomes applications from all persons who meet the entrance requirements and highly encourages members of culturally-diverse groups to apply.

All applications for the program are due February 1st. Applications received after February 1st are reviewed on a space-available basis. The requirements for full standing admission include:

- A completed application
- A minimum undergraduate cumulative GPA of 3.0 on a 4.0 scale, or a minimum GPA of 3.0 on 10 semester credits of graduate coursework*
- Personal and professional references
- A detailed statement of purpose

Applications can be obtained online at https://www.ndsu.edu/gradschool/apply (https://www.ndsu.edu/gradschool/apply/)

*In rare cases, if an applicant does not meet the 3.0 GPA guideline set above, but has between a 2.5 and 3.0 GPA, faculty may consider them for conditional acceptance into the program. In this situation, the applicant must include in the application materials a separate letter explaining the circumstances related to the lower GPA and defining specific measures taken to prepare for current academic success. If faculty members determine the prospective student shows potential as evidenced by their application materials, they will invite them for an interview. If accepted following the interview, they receive conditional acceptance.

Students in conditional standing must then receive a GPA of 3.5 or better for the first 9 semester credit hours, meet disposition requirements, and meet any other conditions set by the Counselor Education faculty. Upon review of the faculty, conditionally accepted students who meet the criteria above receive acceptance; those who do not meet the criteria above will not be permitted to continue in the program.

Financial Assistance

Graduate assistantships are available across campus. 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.

Counselor Education students must complete the required courses and specialization courses listed below. Electives must be approved by the advisor prior to taking the course(s).

The Counselor Education program does not credential, license, or certify graduates. However, our program meets counseling educational standards and prepares students to meet credentialing, licensure, and/or certification requirements. Students who plan to work outside of North Dakota should discuss their plans with their advisers and review these out-of-state requirements.

Master of Education

Code	Title	Credits
Required Courses		
EDUC 703	Research, Measurement and Program Evaluation	3

CNED 710	Counseling Techniques	3
CNED 711	Counseling Theory	3
CNED 712	Counseling Across the Lifespan	3
CNED 713	Assessment Techniques	3
CNED 714	Career Counseling and Testing	3
CNED 715	Professional Orientation and Ethics	3
CNED 716	Social and Cultural Foundtions of Counseling	3
CNED 720	Group Counseling	3
CNED 732	Family Counseling	3
CNED 734	Dynamics of Addiction	3
CNED 731	Counseling Children and Adolescents	3
CNED 794	Practicum/Internship (Practicum)	3
CNED 794	Practicum/Internship (Internship)	6-9
Specialization Options		
Clinical Mental Health Counseling		
CNED 730	Crisis and Trauma in Counseling Practice	3
CNED 723	Psychopathology and Diagnosis for Counselors	3
CNED 863	Advanced Clinical Assessment, Report Writing, & Treatment Planning	3
CNED 890	Graduate Seminar	3
Elective (if doing 6 credits of internship)		3
OR		
School Counseling		
CNED 728	Guidance Administration and Consulting	3
CNED 729	Professional K-12 School Counseling	3
Electives/Teacher Education Courses		6 (9 if doing 6 credits of internship)
Total Credits (required courses, plus specialty option)		**60**

Carol E. Buchholz Holland, Ph.D.
Kansas State University, 2005
Research Interests: School Counseling; Solution Focused Counseling Approaches

Jessica Danielson, Ph.D., LPCC-S, NCC
North Dakota State University, 2017
Research Interests: Female Partner Family Formation, Creative Pedagogy in Counselor Education and Supervision, Marginalized Counselor Identities, Power and Privilege in Academia, and Feminist Issues

Brenda Hall, Ed.D., Emeritus Faculty
Virginia Polytechnic Institute and State University, 1993
Research Interests: Intimate Partner Violence, Relational Cultural Theory, and Collaborative Group Practices Studies

Todd F. Lewis, Ph.D., LPC, NCC
Kent State University, 2002
Research interests: Risk Factors for Drinking during Emerging Adulthood, Theoretical Explanations for College Drinking and Substance Abuse, Substance Abuse Interventions, Motivational Interviewing, Process Addictions, and Quantitative Methods for Investigating these issues.

Jill Nelson, Ph.D.
Kent State University, 2005
Research Interests: Shame and Shame Resilience, Mentoring, Community Well-Being Interventions, and Women's Issues in Higher Education

Jodi L. Tangen, Ph.D., LPC, NCC, ACS
University of North Carolina at Greensboro, 2015

Research Interests: Spirituality/Religion in Counseling, Existential and Jungian Theories, Multicultural and Feminist Theory and Practice, Clinical Supervision, and Relational Depth

Counselor Education and Supervision

Department Information

- **Graduate Coordinator:**
  Jodi Tangen, Ph.D.
- **Department Location:**
  Morril Hall 221
- **Department Web Site:**
  www.ndsu.edu/ceduc/ (http://www.ndsu.edu/ceduc/)
- **Application Deadline:**
  February 1 for fall admission
- **Credential Offered:**
  Ph.D.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

The Counselor Education program offers graduate study leading to a Doctor of Philosophy (Ph.D.) in Counselor Education and Supervision. The doctoral program in Counselor Education and Supervision is accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP), which ensures the highest educational standards are met. Graduates of our programs are trained to be leaders in teaching, clinical supervision, counseling practice, research, and advocacy. The culture of the doctoral program is highly relational and individualized to meet diverse students' needs. Faculty members admit a small number of students each year, so that we may build strong relationships with students and support their educational aspirations. The counselor education faculty members have a wide variety of theoretical orientations and areas of expertise.

The Counselor Education Program welcomes applications from all persons who meet the entrance requirements and highly encourages members of culturally-diverse groups to apply.

The application deadline is February 1st of each year for admission the following fall semester. Applications received after the deadline will be reviewed on a space-available basis. Students are admitted once per year.

Required documents for graduate admission application for the NDSU Counselor Education and Supervision doctoral program include:

- A completed application (including official transcripts from all colleges/universities where coursework was completed)
- Curriculum vitae or resume
- Personal and professional references
- A detailed statement of purpose

Applications can be obtained online at https://www.ndsu.edu/gradschool/apply (https://www.ndsu.edu/gradschool/apply/)

Admission Criteria

In order to be considered for admission to the program, applicants must:

- Meet graduate school minimum requirements for admission and have evidence of academic aptitude for doctoral-level study.
- Have a master's degree in counseling, or a closely related field that closely aligns with CACREP standards. Graduates from CACREP-accredited programs receive preference. Students with master's degrees from non-CACREP accredited programs may be considered, but they must meet all CACREP requirements for a master's degree prior to taking related core doctoral classes.
- Previous professional experience.
- Show evidence of fitness for the counseling profession, including self-awareness and emotional stability during interactions with faculty and other students that occur in the interview process.
- Show evidence of excellent oral and written communication skills, and professional potential by submitting a statement of purpose essay. The applicant's statement of purpose should address: (1) goals for obtaining a doctoral degree, (2) professional experience, (3) research interests, and (4) potential for scholarship, professional leadership, and advocacy.
- Show evidence of cultural sensitivity and awareness.
- Understand and comply with the American Counseling Code of Ethics (or ASCA ethical standards where appropriate).

- Sign a disclosure statement regarding activities which may be deemed inappropriate by professional and/or ethical standards.
- Complete all international student requirements, where appropriate.

Financial Assistance

Limited graduate assistantships are available in the School of Education and on campus. We do not guarantee students an assistantship, but will alert students when we are aware of opportunities and support them in securing an appropriate assistantship. Students must be accepted into the Graduate School before they are eligible for an assistantship.

The doctoral degree in Counselor Education and Supervision requires a minimum of 60 semester credits beyond the master's degree. Students must successfully complete required courses, electives, a 600 hour doctoral internship, comprehensive exams and a disquisition.

Code	Title	Credits
Required Courses		
CNED 879	Quantitative and Survey Research	3
CNED 870	Counselor Supervision	3
CNED 887	Professional Issues: Professional Development, Consultation and Publishing	3
CNED 869		3
CNED 871		3
CNED 872		3
CNED 876		3
CNED 894	Practicum/Internship (Enroll in two semesters for a total of 9 credits.)	9
CNED 899	Doctoral Dissertation	15
Statistics		
STAT 725	Applied Statistics	3
Additional Statistics Course		3
Additional Electives		6
CNED 866	Leadership and Advocacy in Counselor Education and Supervision	3
Total Credits		**60**

Carol E. Buchholz Holland, Ph.D.
Kansas State University, 2005
Research Interests: School Counseling, Solution Focused Counseling Approaches

Jessica Danielson, Ph.D., LPCC-S, NCC
North Dakota State University, 2017
Research Interests: Female Partner Family Formation, Creative Pedagogy in Counselor Education and Supervision, Marginalized Counselor Identities, Power and Privilege in Academia, and Feminist Issues

Brenda Hall, Ed.D., Emeritus Faculty
Virginia Polytechnic Institute and State University, 1993
Research Interests: Intimate Partner Violence, Relational Cultural Theory, and Collaborative Group Practices Studies

Todd F. Lewis, Ph.D., LPC, NCC
Kent State University, 2002
Research interests: Risk Factors for Drinking during Emerging Adulthood, Theoretical Explanations for College Drinking and Substance Abuse, Substance Abuse Interventions, Motivational Interviewing, Process Addictions, and Quantitative Methods for Investigating These Issues.

Jill Nelson, Ph.D.
Kent State University, 2005
Research Interests: Shame and Shame Resilience, Mentoring, Community Well-Being Interventions, and Women's Issues in Higher Education.

Jodi L. Tangen, Ph.D., LPC, NCC, ACS
The University of North Carolina at Greensboro, 2015
Research Interests: Spirituality/Religion in Counseling, Existential and Jungian Theories, Multicultural and Feminist Theory and Practice, Clinical Supervision, and Relational Depth

Criminal Justice

Department Information

- **Department Chair:**
  Amy Stichman, Ph.D.
- **Graduate Coordinator:**
  Andrew J. Myers, Ph.D.
- **Department Location:**
  104 Putnam Hall
- **Department Phone:**
  (701) 231-8567
- **Department Web Site:**
  www.ndsu.edu/criminaljustice/ (http://www.ndsu.edu/criminaljustice/)
- **Application Deadline:**
  April 1 for Ph.D. applicants, Master's applications accepted for fall and spring enrollments on a rolling basis.
- **Credential Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL ibT 100, IELTS 7, Duolingo 125; to qualify for assistantship TOEFL ibT 114, IELTS 8, Duolingo 135

The Department of Criminal Justice offers graduate study leading to both a Master of Science (M.S) .and a Doctor of Philosophy (Ph.D.) degree in Criminal Justice. The M.S. degree has three tracks: Applied Criminal Justice, Criminology, and the Plan C option (which is geared toward professionals working in the criminal justice system and social service agencies). The program in Criminal Justice is designed to enhance student skills in understanding, gathering, processing, and analyzing research in the areas of criminology and criminal justice. The program is geared to understanding, critiquing, and analyzing the causes of crime and the criminal justice system's responses to it. The curriculum consists of foundation courses in theory, policy, and research methods, plus three substantive areas: 1) criminology, 2) policing, and 3) corrections. Students have their choice of specializing in one of the three.

Students will also be afforded course work in learning how to teach a college course.

Graduates will find an expanding and terrific academic job market available as well as professional employment in the criminal justice policy and research sector. There are currently fewer than 40 Criminal Justice Ph.D. programs operating on a national level, so students graduating with a Criminal Justice Ph.D. will be competitive for the 350 positions available annually in academic units.

Doctor of Philosophy

Students should enter the program with an approved master's degree. Students will be required to have had one course in research methods and one course in statistics. Plus, students should have adequate background preparation or demonstrated potential in the field of criminology or criminal justice.

Students will be required to submit their undergraduate and graduate transcripts. For admission to full standing, students are required achieve a minimum grade point average of 3.0 over their last 60 credit hours. Students not meeting this standard 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.

Master of Science

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.

Accelerated Master's Degree in Criminal Justice

The accelerated master's program allows exceptional undergraduate criminal justice students to complete their master's degree in three semesters beyond the bachelor's degree.

ADMISSION PROCESS: Upon completion of 60 undergraduate credit hours, eligible Criminal Justice majors can apply to the accelerated master's program. A minimum GPA of 3.5 for the Criminal Justice major, an overall cumulative GPA of 3.5, and successful completion of CJ 325 (Applied Research Methods) are required prior to admission to the program. Students may apply while enrolled in CJ 325, but must earn a minimum grade of "B" prior to beginning graduate coursework. Interested students may apply by completing an application on the NDSU graduate school website (www.ndsu.edu/graduateschool), requesting at least two letters of recommendation from faculty or instructors, and submitting a statement of intent

explaining why the applicant wants to pursue a master's degree in Criminal Justice. Interested students should apply early in the criminal justice program as credits from completed 400 level courses cannot be retroactively applied to the accelerated master's program.

COURSES: Once admitted to the Accelerated Master's program, students will take four 400/600 level courses (CJ 606 Crime and Delinquency; CJ 607 Deviant Behavior; CJ 660 Criminal Court System, and CJ 661 Corrections) to fulfill the requirements for their Bachelor's degree in Criminal Justice and also receiving credit toward a master's degree in Criminal Justice. Students enrolling in these courses at the 600 level can expect additional reading and writing beyond expectations for students completing these courses for 400 level credit. Students are required to earn a minimum of a "B" in order for the course to count toward the master's degree. Students failing to earn a "B" in any of the 400/600 cross-listed courses will be allowed to repeat the course once.. Students receiving anything below a "B" in a retaking of a 400/600 level course will be removed from the program and will not be allowed to re-apply for admission into the accelerated program or the traditional master's program. Transfer credits from courses completed at other universities are not accepted for the accelerated master's program. Upon successful completion of the requirements for a baccalaureate degree, students will begin taking 700 level graduate courses.

Doctor of Philosophy

Students admitted to the doctoral program who have earned a master's degree in criminal justice/criminology will be given credit for their master's degree (up to 30 credits) and must take a minimum of 60 credits at NDSU. The amount of credit for the master's degree will be determined by the graduate program coordinator.

Students entering with a master's degree that is not related to criminal justice/criminology must have a total must complete 90 credits post-baccalaureate.

Code	Title	Credits
Required Courses		
Theory/Policy		**9**
CJ 703	Advanced Criminology	
CJ 709	Criminal Justice Policy	
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	
Research Skills (at least 9 of these credits must be completed at NDSU)		**15**
CJ 702	Program Evaluation	
CJ 734	Advanced Criminal Justice Methods	
CJ 759	Advanced Research Design in Criminal Justice	
STAT 725	Applied Statistics	
STAT 726	Applied Regression and Analysis of Variance	
Substantive Areas (Students must complete four courses in a substantive area of choice. Additionally, students must complete one course in each of their non-substantive areas.		**18**
Criminology		
CJ 721	Individual Theories of Crime	
CJ 722	Structural Theories of Crime	
CJ 750	Violence	
CJ 752	Crime and the Life Course	
Corrections		
CJ 707	Juvenile Corrections	
CJ 733	Issues in Institutional Corrections	
CJ 762	Community Corrections	
CJ 763	Correctional Rehabilitation	
CJ 764	Punishment and Society	
Policing		
CJ 754	Police and Society	
CJ 755	Criminal Justice Leadership and Administration	
CJ 760	Police and Race Issues	
CJ 761	Police Effectiveness	
CJ 765	Classics in Policing	
****Electives/Independent Study (Students should consult with their advisor as to other potentially appropriate electives. Below are example courses.)**		**15**
CJ 768	Gender and Justice	
CJ 793	Individual Study	

PSYC 640	Experimental Methods	
PSYC 670	Experimental Social Psychology	
SOC 700	Qualitative Methods	
STAT 660	Applied Survey Sampling	
STAT 665	Meta-Analysis Methods	
CJ 899	Doctoral Dissertation	12
Total Credits		60-90

**
36 credits for for students entering the program with a master's degree that is not related to criminal justice/criminology

Master of Science

Students will need to declare their choice of a track by the end of their first semester in the program.

Code	Title	Credits
Required Foundation Courses		
CJ 702	Program Evaluation	3
CJ 703	Advanced Criminology	3
CJ 709	Criminal Justice Policy	3
CJ 734	Advanced Criminal Justice Methods	3
STAT 725	Applied Statistics (not required for Plan C option)	3
Plan A - Thesis Option		
Foundation Courses		15
Electives		9
CJ 798	Master's Thesis	6
Plan B - Master's Paper Option		
Foundation Courses		15
Electives		12
CJ 797	Master's Paper	3
Plan C - Culminating Experience		
Foundation Courses		12
Electives		15
CJ 793	Individual Study	3
Electives		
Corrections		
CJ 707	Juvenile Corrections	
CJ 733	Issues in Institutional Corrections	
CJ 762	Community Corrections	
CJ 763	Correctional Rehabilitation	
CJ 764	Punishment and Society	
Policing		
CJ 754	Police and Society	
CJ 760	Police and Race Issues	
CJ 761	Police Effectiveness	
CJ 765	Classics in Policing	
Criminology		
CJ 721	Individual Theories of Crime	
CJ 722	Structural Theories of Crime	
CJ 752	Crime and the Life Course	
CJ 750	Violence	
CJ 768	Gender and Justice	
Other Electives		

CJ 606	Crime and Delinquency	
CJ 607	Deviant Behavior	
CJ 660	Criminal Court System	3
CJ 661	Corrections	3
CJ 665	Gender, Race and Ethnicity in Criminal Justice	3
CJ 732	Applied Interpretation of Criminal Justice Methods	3
CJ 755	Criminal Justice Leadership and Administration	
CJ 759	Advanced Research Design in Criminal Justice	3
CJ 766	Managing Liability and Risk in Criminal Justice	
CJ 767	Reform and Accountability in Criminal Justice and Crime Policies	3
CJ 796	Special Topics	
Master's Thesis / Policy Paper /Culminating Experience		
CJ 798	Master's Thesis	6
CJ 797	Master's Paper	3
CJ 793	Individual Study (with culuminating project)	3
Total Credits		**30**

Carol Archbold, Ph.D.
University of Nebraska-Omaha, 2002
Research Interests: Policing (accountability/reform, liability, misconduct, and risk management), Race and Gender in the Criminal Justice System

Andrew Myer, Ph.D.
University of Cincinnati, 2010
Research Interests: Effective Correctional Interventions, Evidence Based Program Evaluation, Actuarial Offender Risk Assessment Practices, and Macro-Social Research Methods

Amy J. Stichman, Ph.D.
University of Cincinnati, 2003
Research Interests: Corrections, Institutional Life, Inmate and Correctional Officer Attitudes, Treatment Program Evaluation, Gender Issues

Kevin M. Thompson, Ph.D.
University of Arizona, 1986
Research Interests: Delinquency, Quantitative Methods, Alcohol and Drugs, Juvenile Drug Courts

Cybersecurity Certificate

The need for cybersecurity professionals is rapidly growing. Nearly every government, military, financial institution, medical establishment, and viable businesses collect, process, and store confidential information in databases. Cyber-attacks and digital spying can take many forms, including high visibility and very damaging offenses such as data breaches, phishing, and identity theft. Attacks can take place within databases, while data is processed, or when it is transmitted across networks. In the world of today, cyber-attacks may be a greater threat than terrorism.

Enrolled students will take courses online or on-campus and learn about best practices, new technology, and research in cybersecurity. The certificate program can be completed completely online or through a combination of online and on-campus courses.

Completion of the Graduate Certificate in Cybersecurity requires completion of 12 graduate credits. This includes three required courses as well as one elective course.

Code	Title	Credits
Required Courses		
CSCI 603	Defensive Network Security	3
CSCI 604	Ethical Hacking	3
CSCI 610	Computer Crime and Forensics	3
Required Elective: Select 3 credits from the list below.		3
CSCI 609	Cybersecurity Law and Policy	
CSCI 669	Network Security	
CSCI 773	Foundations of the Digital Enterprise	
CSCI 774	Topics of the Digital Enterprise	

CSCI 783	Topics In Software Systems (cybersecurity focus)	
Total Credits		**12**

Students can request consideration of other courses for the required elective by contacting the cybersecurity program coordinator.

Zahid Anwar, Ph.D.
University of Illinois at Urbana-Champaign, 2008
Research Interests: Cybersecurity Policy and Law, Artificial Intelligence and Machine Learning

Anne Denton, Ph.D.
University of Mainz, 1996
Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Databases, Geospatial Data, Cloud Computing

Ajay Jha, Ph.D.
Kyungpook National University, 2017
Research Interests: Software Engineering, Software Testing and Maintenance

Jun Kong, Ph.D.
University of Texas, Dallas, 2005
Research Interests: Human Computer Interaction, Mobile Computing, Software Engineering

Pratap Kotala, Ph.D.
North Dakota State University, 2015
Research Interests: Software Engineering

Juan (Jen) Li, Ph.D.
University of British Columbia, 2008
Research Interests: Smart and Connected Health, Semantic Web Technologies, Internet of Things (IoT)

Lu Liu, Ph.D.
University of Texas San Antonio, 2017
Research Interests: Bioinformatics, Data Mining, Machine Learning, Data Science

Simone Ludwig, Ph.D.
Brunel University, 2004
Research Interests: Swarm Intelligence, Evolutionary Computation, Deep Neural Networks, Fuzzy Reasoning, Machine Learning

Kenneth Magel, Ph.D.
Brown University, 1977
Research Interests: Software Engineering, Human-Computer Interfaces, Software Complexity, and Software Design

M. Zubair Malik, Ph.D.
University of Texas at Austin, 2014
Research Interests: Program Analysis, Automated Program Repair, Secure Software Development, Software Verification-Validation and Testing, Software Systems (especially large scale Distributed Systems for Data science and Machine Learning), Formal Methods, Application of Artificial Intelligence in Program Analysis

Oksana Myronovych, Ph.D.
North Dakota State University, 2009
Research Interests: Software Engineering

Saeed Salem, Ph.D.
Rensselaer Polytechnic Institute, 2009
Research Interests: Bioinformatics, Machine Learning and Data Mining

Jeremy Straub, Ph.D.
University of North Dakota, 2015
Research Interests: Multi-tier Mission Architecture & Control, Autonomous Data Link Reduction, Autonomous Vehicle Control, Machine Vision, Super Resolution

Vasant Ubhaya, Ph.D.
University of California-Berkeley, 1971
Research Interests: Algorithm Analysis, Approximation and Optimization

Changhui Yan, Ph.D.
Iowa State University, 2005

Research Interests: Bioinformatics, Computational Biology, Genomics, Machine Learning, Data Mining, Big Data, Cloud Computing

Data Science

Department Information

- **Program Contacts:**
  Simone Ludwig, Ph.D.; Rhonda Magel, Ph.D.
- **Email:**
  simone.ludwig@ndsu.edu; rhonda.magel@ndsu.edu
- **Department Web Site:**
  https://www.ndsu.edu/data_science/
- **Credential Offered:**
  M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

Our master's degree program is designed to equip you with advanced skills for success in today's data-driven world. This strategic program seamlessly blends statistics and computer science, providing a deep understanding of data analysis, predictive modeling, and machine learning techniques while establishing a robust foundation in statistical methodologies and computational proficiency. Navigate data collection, interpretation, and cleaning intricacies, simultaneously mastering programming languages and tools crucial for efficient data manipulation and analysis. Through a specialized focus on statistics, you'll gain the expertise to extract valuable insights from complex datasets, make informed data-driven decisions, and expertly communicate findings to diverse audiences. By harmoniously merging statistics and computer science, this program empowers you to tackle real-world challenges using the power of data. Whether your ambitions gravitate towards data science, machine learning, or business analysis, our flexible master's degree, enriched by the guidance of experienced faculty from two departments, opens doors to opportunities in the dynamic landscape of data science.

Degree Requirements

Code	Title	Credits
DATA 720	Programming for Data Science	3
DATA 622		3
DATA 761	Applied Machine Learning	3
DATA 765	Applied Database Systems	3
DATA 787	Data Science Ethics	3
DATA 711	Basic Computational Statistics using R	3
DATA 713	Introduction to Data Science	3
DATA 725	Applied Statistics	3
DATA 726	Applied Regression and Analysis of Variance	3
Electives - 6 credits required		6
DATA 760	Applied Artificial Intelligence	
DATA 660		
DATA 662		
DATA 650		
DATA 706	Data-Driven Security	
DATA 714	Statistical Big Data Visualization	
Total Credits		**33**

Developmental Science

Department Information

- **Department Head:**
  Joel Hektner, Ph.D.
- **Graduate Coordinator:**
  Heather Fuller, Ph.D.
- **Email:**
  heather.fuller@ndsu.edu

- **Department Location:**
  Evelyn Morrow Lebedeff Hall
- **Department Phone:**
  (701) 231-8268
- **Department Web Site:**
  www.ndsu.edu/hdfs/graduate_studies/ds/ (http://www.ndsu.edu/hdfs/graduate_studies/ds/)
- **Application Deadline:**
  February 1
- **Credential Offered:**
  Ph.D.
- **English Proficiency Requirements:**
  TOEFL ibT 100 (subscores of at least 24 for speaking and 21 for writing); IELTS 7; Duolingo 125

Developmental Science is an interdisciplinary approach to the study of behavioral, psychological, and social aspects of human development that draws from fields including Human Development and Family Science and Developmental Psychology. Developmental Science entails the study of human development across the lifespan, integrating the biological, cognitive, and socioemotional underpinnings of development, and incorporating the familial, social, institutional, and cultural contexts in which development occurs.

- Cumulative GPA of 3.0 or higher
- Statement of purpose should be 500 words or less and address the following:
  - 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) (https://www.ndsu.edu/hdfs/graduate_studies/ds/developmental_science_program_faculty/).
  - 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
- Three letters of recommendation from people who know your academic work well
- Submission of GRE Scores is optional. Lack of scores will not affect admissions decision.
- For non-native English speakers, TOEFL ibT score of 100 (subscores of 24 for speaking and 21 for writing) or IELTS score of 7 or Duolingo score of 125

For those entering with a Master's degree:

- Master's degree from accredited educational institution in child development, developmental psychology, human development, developmental science, or related area
- At least one course in statistics and one course in research methods, with a grade of B or higher
- Completion of an empirical Master's thesis

For those entering with a Bachelor's degree:

- Bachelor's degree from accredited educational institution in child development, developmental psychology, human development, developmental science, or related area

Financial Assistance

All admitted students are offered graduate assistantships. In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

Curriculum for students entering with a Bachelor's degree (90 credits total)

- Students earn a Master's degree after completing 30 credits, master's oral examination and the master's thesis.
- All courses are 3 credits unless otherwise noted.

Code	Title	Credits
Development Core		**12**
HDFS 811	Developmental Concepts and Theories	
HDFS 813	Social and Emotional Development Across the Lifespan	
HDFS 815	Physical and Cognitive Development Across the Lifespan	

HDFS 817	Prevention Science	
Teaching Core		**6**
HDFS 802	Teaching and Learning in the Human Sciences [1]	
HDFS 892	Graduate Teaching Experience	
Methodology and Statistics Core		**12**
HDFS 705	Quantitative Methods in Developmental Science	
HDFS 805	Research Methods and Scholar Development in Human Sciences	
HDFS 854	Advanced Quantitative Methods in Developmental Science [1]	
HDFS 856	Longitudinal Research Methods and Analysis [1]	
Electives		**15**
Must include 9 credits in didactic 700- or 800-level courses (in HDFS or other departments) (HDFS 824 or HDFS 825 recommended)		
Can include, distributed in varying credit amounts across multiple semesters:		
HDFS 893	Individual Study/Tutorial (maximum of 6 additional credits (beyond the 17 required))	
HDFS 894	Practicum/Internship (focus on teaching or non-academic role)	
Non-Didactic Courses		**7**
HDFS 890	Graduate Seminar (Orientation/Comps/Career, 7 credits total)	
1 credit orientation in first semester; 4 credits to prep and complete comprehensive exam; 2 credits during final year to focus on career development		
Independent Research		**38**
HDFS 893	Individual Study/Tutorial (17 credits)	
HDFS 798	Master's Thesis (6 credits)	
HDFS 899	Doctoral Dissertation (15 credits)	
Total Credits		**90**

Curriculum for students entering with a Master's degree (60 credits total)

- Students may follow this track only if their Master's degree and thesis was approved by the Developmental Science Committee upon admission.
- Additional coursework may be necessary to compensate for courses not taken.
- All courses 3 credits unless otherwise noted.

Code	Title	Credits
Development Core		**12**
HDFS 811	Developmental Concepts and Theories	
HDFS 813	Social and Emotional Development Across the Lifespan	
HDFS 815	Physical and Cognitive Development Across the Lifespan	
HDFS 817	Prevention Science	
Teaching Core		**6**
HDFS 802	Teaching and Learning in the Human Sciences [1]	
HDFS 892	Graduate Teaching Experience	
Methodology and Statistics Core		**9**
HDFS 805	Research Methods and Scholar Development in Human Sciences	
HDFS 854	Advanced Quantitative Methods in Developmental Science [1]	
HDFS 856	Longitudinal Research Methods and Analysis [1]	
Elective		**3**
could include HDFS 824, HDFS 825, HDFS 893, HDFS 894, or 700- or 800-level course in HDFS or other department.		
Non-Didactic Courses		**7**
HDFS 890	Graduate Seminar (Orientation/Comps/Career, 7 credits total)	
1 credit orientation in first semester; 4 credits to prep and complete comprehensive exam; 2 credits during final year to focus on career development		
Independent Research		**23**
HDFS 893	Individual Study/Tutorial (8 credits)	
HDFS 899	Doctoral Dissertation (15 credits)	
Total Credits		**60**

1. Course can be substituted with another course approved by advisor and committee or program coordinator.

Other Requirements

- Teach one undergraduate course, with supervision, for course credit in HDFS 892 Graduate Teaching Experience. Must have first taken a teaching pedagogy course HDFS 802 Teaching and Learning in the Human Sciences, COMM 702 Introduction to College Teaching in the Humanities and Social Sciences, or STEM 810 Teaching College Science, as well as two courses out of HDFS 811 Developmental Concepts and Theories, HDFS 813 Social and Emotional Development Across the Lifespan, HDFS 815 Physical and Cognitive Development Across the Lifespan, and HDFS 817 Prevention 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 798 Master's Thesis, HDFS 893 Individual Study/Tutorial , and/or HDFS 899 Doctoral Dissertation.
- Successful qualifying examination.
- Successful comprehensive/preliminary examination (dissertation proposal) and successful final examination (dissertation defense). If entering without MS degree, successful thesis defense.

Core Faculty

Sean Brotherson, Ph.D.
Oregon State University, 2000
Research Interests: Parenting and Fatherhood; Healthy Marriages; Family Stress; Rural Families; Grief and Bereavement; Family Life Education; Family Policy

James E. Deal, Ph.D.
University of Georgia, 1987
Research Interests: Personality Development in Children; Relationship Between Individual Development and Family Relationships

Heather Fuller, Ph.D.
University of Michigan, 2009
Research Interests: Social Relationships Across the Lifespan (e.g. Intergenerational Relationships); Successful Aging and Health Promotion; Aging in Rural and Cross-cultural Contexts; Aging Families and Caregiving; Aging-in-Place, Survey Research and Program Evaluation

Joel Hektner, Ph.D.
University of Chicago, 1996
Research Interests: Prevention Programs For Children with Adjustment Problems; Peer Affiliation Patterns and Peer Influences on Children's Behaviors; Family and School Conditions That Facilitate Optimal Experiences (Flow) and Optimal Development; Social Emotional Learning; Program Evaluation; The Experience Sampling Method

Carmen Kho, Ph.D.
University of California Merced, 2020
Research Interests: How cultural, family, and other contextual influences intersect with socio-emotional development of children, adolescents, and emerging adults.

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

Leanna McWood, PhD.
Auburn University, 2020
Research Interests: Extracurricular Involvement; Social Relationships; Contextual Influences; Sleep; Adolescent Development

Natira Mullet, Ph.D.
Texas Tech University, 2020
Research Interests: Intergenerational, cultural and familial protective factors to reduce interpersonal trauma and resulting substance use and mental health outcomes among marginalized communities.

Wen Wang, Ph.D.
Michigan State University, 2018
Research Interests: How culture and ethnicity shape parenting; Socialization of children's mastery motivation in at-risk families

Affiliated Faculty within HDFS

Margaret Fitzgerald, Ph.D.
Iowa State University, 1997
Research Interests: Family owned businesses--copreneurial couples, women and minority-owned businesses, the interface between the business, family, and community, and managerial adjustment strategies.

Christi McGeorge, Ph.D.
University of Minnesota, 2005
Research Interests: Heterosexism and Homophobia; Single Parenting; Women's History; Gender Socialization From a Feminist Perspective

Meagan Scott Hoffman, Ph.D.
Oklahoma State University, 2016
Research Interests: Understanding How Changing Trends in Society Influence Youth; Afterschool Training; Positive Youth Development; Professional Development Methods to Better Meet the Needs of 4-H Staff

Dietetics

Department Information

- **Department Chair:**
  Yeong Rhee, Ph.D.
- **Graduate Coordinator:**
  Elizabeth Hilliard, Ph.D.
- **Department Location:**
  Bentson Bunker Fieldhouse, Rm. 1
- **Department Phone:**
  (701) 231-7474
- **Department Web Site:**
  www.ndsu.edu/hnes/graduate_programs/dietetics_on_line/ (http://www.ndsu.edu/hnes/graduate_programs/dietetics_on_line/)
- **Credential Offered:**
  M.S.

The M.S. in Dietetics program prepares registered dietitians to practice at an advanced level or pursue doctoral study. The Interactive Distance Education Alliance (https://www.idea.edu/programs/) 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.

In a multi-institution degree program, students (must be registered dietitians or registration-eligible dietetic graduates):

1. Apply and are admitted to one university;
2. Enroll in all courses at that university; and
3. Graduate or receive a certificate from that university.

Students will be required to complete thirty-six credit hours and the following requirements:

- All core courses (9 credits)
- An additional 21 credits selected from the list of electives
- A thesis (6 credits) or 3 credits of additional electives + a comprehensive paper (plan B) or 6 credits of additional electives (Plan C).
- The student's schedule of courses must be approved by his/her faculty adviser and graduate committee and the Graduate School.

Code	Title	Credits
Core Courses		
HNES 710	Introduction to Research Design and Methods in HNES	3
HNES 728	Current Issues & Trends in Dietetics Practice	2
STAT 725	Applied Statistics	3
Electives (Plan A - 18 credits, Plan C - 24 credits)		18-24
ADHM 635	Cost Controls in Hospitality and Food Service Systems	
ADHM 736	Entrepreneurship in Dietetics	
HNES 642	Community Health and Nutrition Education	

HNES 652	Physical Health, Wellness, Nutrition and Active Aging	
HNES 655	Sports Nutrition	
HNES 658	Advanced Medical Nutrition Therapy	
HNES 719	Public Health Nutrition	
HNES 724	Nutrition Education	
HNES 726	Nutrition in Wellness	
HNES 729	Grant Writing for the Health Professional	
HNES 730	Fundamentals of Leadership	
HNES 732	Foodservice Operation Management	
HNES 733	Food Writing for Professionals	
HNES 734	Foodservice Systems within Healthcare	
HNES 740	Maternal and Child Nutrition	
HNES 741	International Nutrition	
HNES 742	Nutrition: A Focus on Life Stages	
HNES 743	Obesity Across the Lifespan	
HNES 744	Dietary and Herbal Supplements	
HNES 746	Nutrition and Health Disparities	
HNES 747	Understanding Food Culture	
HNES 750	Advanced Human Nutrition: Macronutrients	
HNES 751	Metabolism of Micronutrients	
HNES 752	Phytochemicals	
HNES 753	Nutrigenomics and Advanced Lipid Metabolism in Human Nutrition	
HNES 756	Pediatric Clinical Nutrition	
HNES 757	Nutritional Aspects of Oncology	
HNES 758	Clinical Aspects of Nutrition Support	
HNES 759	Nutrition and Immunology	
Research (Plan A only)		**6**
HNES 798	Master's Thesis	
Total Credits		**32**

Elizabeth Hilliard, Ph.D.
North Dakota State University, 2018
Research Interests: Maternal and Child Nutrition. Community Health

Yeong Rhee, Ph.D.
Oklahoma State University, 1999
Research Interests: Chronic Disease Prevention, Immune Function, Functional Foods, Microbiome

Sherri Nordstrom Stastny, Ph.D.
North Dakota State University, 2007
Research Interests: Macronutrients for Health Aging

Digital Marketing and Innovation

Department Information

- **Program Coordinator:**
  Elizabeth Worth, M.Ed.
- **Email:**
  elizabeth.worth@ndsu.edu
- **Department Location:**
  Barry Hall
- **Department Phone:**
  (701) 231-6038
- **Department Web Site:**
  www.ndsu.edu/business/programs/graduate/graduate_certificates/ (http://www.ndsu.edu/business/programs/graduate/graduate_certificates/)

- **Credential Offered:**
  Graduate Certificate

The Digital Marketing and Innovation Graduate Certificate advances participants' knowledge and skill in areas such as marketing strategy, communication, and customer intelligence. Students learn about such topics as new product development, strategy analysis, search engine optimization, marketing analytics, integrated marketing communications, various media vehicles, and much more.

Curriculum

The certificate requires 8 credits of study, comprised of the following four courses.

Code	Title	Credits
MBA 721	Creating and Marketing Innovations	2
MBA 722	Marketing Analytics and Customer Intelligence	2
MBA 723	Digital Marketing	2
MBA 724	Integrated Marketing Communications	2
Total Credits		**8**

Discipline Based Education Research

Department Information

- **Program Director:**
  Jennifer Momsen, Ph.D.
- **Department Web Site:**
  www.ndsu.edu/dber/ (http://www.ndsu.edu/dber/)
- **Credential Offered:**
  Ph.D. (Dual Major in DBER and STEM discipline is an option)
- **English Proficiency Requirements:**
  TOEFL iBT 88, IELTS 6.5, Duolingo 110

Applicants are invited for North Dakota State University's (NDSU) interdisciplinary Doctor of Philosophy (Ph.D.) program in Discipline Based Education Research (DBER). The program conducts and disseminates empirical research to improve STEM learning and teaching in higher education.

Coursework centers on graduate-level courses in the discipline area, a common core of DBER courses, and elective courses focused on research training. An interdisciplinary team of faculty supervised the candidate's dissertation research, which will investigate teaching and learning within/across one or more STEM disciplines.

Although interdisciplinary in nature, graduate students in the DBER Ph.D. Program have an academic home in the STEM department/program of their discipline preference. Graduate committee membership includes faculty from the DBER program and from the department/program of discipline preference.

Admission Requirements

Applicants will not be considered without a core faculty member who has agreed to serve as the major adviser. Applicants for the DBER Ph.D. program must meet at least one of the following criteria:

- Completed a masters (or Ph.D.) degree in a STEM discipline.
- Accepted into an NDSU master's program in a STEM discipline.
- Accepted into an NDSU Ph.D. program in a STEM discipline.

The program requires 60 semester hours beyond the master's degree. Additionally, by completion of the doctorate, the coursework must include either a master's degree or its equivalent coursework in the chosen STEM discipline (this applies if the master's degree is in Education or another related field). In consultation with the student's graduate committee, a plan of study will be developed to ensure that the student has a strong background in

- discipline-based educational research at the undergraduate level,
- curriculum, teaching, learning, and assessment, and
- content expertise within a discipline.

Students enrolled in program must maintain an overall GPA of at least 3.0 both within the content area and STEM courses. If the GPA in either component should drop below 3.0, then the student is placed on academic probation within the program for the following semester. If at the end of that semester the GPA remains below 3.0, the student is subject to dismissal from the program.

Code	Title	Credits
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
Elective Graduate Courses in STEM Discipline and/or STEM Education		**18**
(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	

Core Faculty

John Buncher, Physics & STEM Education

Danielle Condry, Microbiology & STEM Education

Warren Christensen, Physics & STEM Education

Mila Kryjevskaia, Physics & STEM Education

Alexey Leontyev, Chemistry & STEM Education

Jennifer Momsen, Biology & STEM Education Ph.D. Program Director

Lisa Montplaisir, Biology & STEM Education

James Nyachwaya, Chemistry, Education, & STEM Education

Katie Wissman, Psychology & STEM Education

Education - Doctoral

Department Information

- **School of Education Head:**
  Jenny Linker, Ph.D.
- **Department Location:**
  School of Education, FLC 210
- **Department Phone:**
  (701) 231-7101
- **Department Web Site:**
  www.ndsu.edu/edol/ (http://www.ndsu.edu/edol/)
- **Application Deadline:**
  February 1 priority deadline, final deadline May 1
- **Credential Offered:**
  Ph.D., Ed.D.
- **English Proficiency Requirements:**
  TOEFL iBT 88, IELTS 6.5, PTE Academic 59; Duolingo 110

The Education Doctoral Programs prepare scholars who advance education research and practice and maintain the integrity and vitality of the profession. Our graduates are stewards of the discipline, individuals entrusted with preserving, creating, and applying knowledge in education and with communicating educational knowledge to others.

North Dakota State University offers both the Doctor of Philosophy (Ph.D.) and Doctor of Education (Ed.D.) degrees in Education, with an emphasis in **Adult and Community Education, Institutional Effectiveness,** or **Organizational Learning and Leadership**. The Ph.D. emphasizes the study and synthesis of theory and research. The purpose of the Ph.D. is to produce dedicated scholar-researchers committed to the advancement of knowledge and scholarship in the field and scholar-practitioners with a strong depth in research preparation for practice. The Ed.D. degree focuses on translating theory and research into practice, and has the larger goal of preparing scholar-practitioners who will be well-informed, credible leaders in the field.

Adult and Community Education

The Adult and Community Education curriculum is designed to provide the knowledge, skills, and experiences required for advancing the nature, function, and scope of adult learning in all educational settings. This program prepares graduates to be leaders in profit and non-profit industries. Graduates become professors of adult or community education, leaders of non-profit organizations, and consultants for training development programs.

Institutional Effectiveness

The Institutional Effectiveness curriculum is designed to provide the knowledge, skills, and experiences needed for understanding institutional performance in all educational settings. This program focuses on the role of assessment, evaluation, and other analysis techniques needed to support institutional planning, policy formation, and decision-making. Graduates become assessment directors at post-secondary institutions and education consultants.

Organizational Learning and Leadership

The Organizational Learning and Leadership curriculum is designed to provide the knowledge, skills, and experiences necessary for promoting organizational change in all educational settings. This program equips graduates to become effective leaders in educational contexts by integrating leadership theory with practice. Graduates become administrators in K-12 and postsecondary schools, museums, and youth development organizations.

Admission

Qualified students may apply for admission through the Graduate School online application. In addition to the standard Graduate School application materials, applicants must submit an essay stating how their career goals align with the mission and goals of the Education Doctoral Programs as described on the program website. Admission is only considered after all required application materials are received by the Graduate School and reviewed by the program's faculty. An interview may be required. Admission is a selective process and decisions are based on the congruency of the applicant's professional goals with the program goals, predicted success of the applicant as a student and professional in the chosen field, and are made only after considering all available data. A student must meet all requirements for unconditional admission. Application deadline for priority admission is February 1 with rolling admissions as space allows after that date.

Financial Assistance

Graduate assistantships may be available in the School of Education. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. Students must be accepted into the Graduate School before they are eligible for an assistantship.

Courses

All registrations in Education doctoral courses must be approved by the student's advisor. Only those courses approved by the student's supervisory committee may be included on the final plan of study leading to the degree.

Credit Hours

The Education doctoral programs require a minimum of 90 semester hours beyond the bachelor's degree (a minimum of 60 semester hours beyond the master's degree). The supervisory committee has authority to approve up to a maximum of 30 credit hours from a Masters degree or equivalent. 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.

Code	Title	Credits
Core Courses		
EDUC 801	Foundations of Doctoral Scholarship	3
EDUC 802	Foundations of Educational Research	3
EDUC 803	Philosophical Foundations of Education	3
EDUC 890	Graduate Seminar (Capstone Seminar)	3
EDUC 890	Graduate Seminar (1 credit per semester)	1

Select One:		**3**
EDUC 806	International and Comparative Education	
EDUC 807	Diversity and Educational Policy	
EDUC 808	Empowerment & Transformative Education	
Discipline Inquiry Core (Note: Required and Optional courses vary by degree and option area)		
EDUC 871	Planning and Conducting Needs Assessment	3
EDUC 872	Qualitative Research Methods	3
EDUC 873	Case-Based Educational Research and Statistics	3
EDUC 881	Computer Data Management and Decision Making	2
EDUC 882	Institutional Analysis Techniques	3
EDUC 883	Survey Research	3
EDUC 884	Program Evaluation Research	3
EDUC 885	Structural Equation Modeling Fundamentals	3
EDUC 886	Advanced Qualitative Research	3
HDFS 856	Longitudinal Research Methods and Analysis	3
Option Core Courses		**9**
Institutional Effectiveness		
EDUC 831	Institutional Quality Control	
EDUC 832	Assessment Techniques for Educational Institutions	
EDUC 833	Strategic Planning for Institutional Improvement	
Adult and Community Education		
EDUC 851	Adult Learning	
EDUC 852	Foundations of Occupational & Adult Education	
EDUC 853	Instructional Methods for Adult Learners	
Organizational Learning and Leadership		
EDUC 811: Organizational Culture (New course, pending approval)		3
EDUC 812: Leadership in Organizations (New course, pending approval)		3
EDUC 813: Innovation and Change (New course, pending approval)		3
Professional Emphasis Area		**9-12**
EDUC 899	**Doctoral Dissertation**	**12**
Total Credits		60-90

Justin Benna, Ph.D.
Assistant Professor
University of New Hampshire, 2018
Research Interests: PK-12 School Leadership, Social and Political Contexts of Schools, Educator Development and Professional Learning

Dean Bresciani, Ph.D.
University Distinguished Professor
University of Arizona, 1996

Amanda Cordova, Ph.D.
Assistant Professor
University of Texas at San Antonio, 2018

Elizabeth A. Gilblom, Ph.D.
Assistant Professor
Cleveland State University, 2017
Research Interests: Geographic Information Systems, Privatization in Education, Equity in Education, Critical Social Theory

Brent D. Hill, Ph.D.
Associate Professor
Oklahoma State University, 2011
Research Interests: Monte Carlo Simulations, Educational and Psychological Measurement, Learning Theory, Structural Equation Modeling, Q Methodology, Time Series Analysis

Hollie Mackey, Ph.D.
Associate Professor

Pennsylvania State University, 2010
Research Interests: Indigenous Theory and Methodology, Critical Policy Analysis, Self-Determination in Education, Ethical Leadership, Education Law

Cailen O'Shea, Ph.D.
Assistant Professor
University of Nebraska-Lincoln, 2020
Research Interests: School Transformation, Innovation for Equitable Education, PK-12 School Leadership, Quantitative Methods

Laura Parson, Ph.D.
Associate Professor
University of North Dakota, 2016
Research Interests: Teaching and Learning in Higher Education (SoTL), Women in Higher Education, Women in STEM, Ethnographic and Discourse Methods of Inquiry

Chris M. Ray, Ph.D.
Oklahoma State University, 2007
Research Interests: Institutional Effectiveness, Learning Outcomes Assessment, Instrument Development, Moral Development and Education, College Student Development

Tamara Uselman, Ed.D.
Visiting Associate Professor
North Dakota State University, 2020

Nate Wood, Ph.D.
Associate Professor
University of Minnesota, 2006
Research Interests/Areas of Expertise: Socio-Cultural Issues in Education, Identity, Classroom Community, Wonder-Informed Pedagogy, Maker Education, Educational Research and Evaluation Methods

Education - Master's

Department Information

- **School of Education Head:**
  Jenny Linker, Ph.D.
- **Department Location:**
  School of Education, FLC 210
- **Department Phone:**
  (701) 231-7101
- **Department Web Site:**
  www.ndsu.edu/ted/ (http://www.ndsu.edu/ted/)
- **Application Deadline:**
  March 15 for summer and fall admission; October 15 for spring admission.
- **Credential Offered:**
  M.Ed.; M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 88, IELTS 6.5, Duolingo 110

The School of Education offers graduate study leading to the Master of Education (M.Ed.) and Master of Science (M.S.) degrees. Candidates may choose to focus their study in the following areas: Computer Science Education, Curriculum and Instruction, English Education, History Education, Mathematics Education, Science Education, Social Science Education, Whole Child Approaches and Teacher Licensure.

The faculty in Teacher Education are committed to the further development of educational leaders who are dedicated to educational equity for all persons. The program is aligned with the National Board for Professional Teaching Standards (NBPTS) and Interstate Teacher Assessment and Support Consortium (InTASC) to reflect the importance of applied research and content development of educators. (Programs offered in Teacher Education are designed for the practitioner.) Candidates pursuing the M.Ed. will engage in action research as a component of the program. The Master of Science (M.S.) degree requires a master's thesis or a master's paper. Students are encouraged to work closely with an academic adviser to ensure that personal and professional goals are clear and achievable.

Teacher Licensure Option

The Teacher Licensure option allows candidates with a degree in a teachable major to complete professional education coursework to earn teacher licensure. The program is aligned with North Dakota (ND) program approval standards but transfers well to other states. Additional content coursework may be needed to meet licensure requirements and will be evaluated upon entry to the program. Passing scores on the Praxis Core Academic Skills exam as well as completion of youth hours is required for full admission to the program. Contact the Teacher Education program for a transcript evaluation to determine a plan of study.

The Teacher Licensure programs are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and are approved by the ND Education Standards and Practices Board. Changes in national and state legislation, standards, or rules can affect academic program requirements.

Content Focused Options

Content-focused master's degree programs in Teacher Education focus on increasing both pedagogical skills and content expertise and are most ideally suited for current school-based educators. 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 who are interested in teaching dual credit courses must complete a minimum of 18 graduate credit hours in the academic field in which they will be teaching. Candidates work with their graduate committee and adviser to identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work with their advisers if licensure is desired.

Candidates may choose from the following content areas:

- Computer Science Education
- English Education
- History Education
- Mathematics Education
- Science Education
- Social Science Education

Whole Child Approaches

The Master's degree in Education with an option in *Whole Child Approaches* integrates education, human development, and health fields to foster holistic approaches to student-centered learning. The program prepares elementary and secondary educators to engage families and communities in creating positive and healthy school climates that promote student wellness and academic achievement. Graduates will be prepared to implement the Whole School, Whole Community, Whole Child model to advance K-12 students' social, emotional, physical, and cognitive development through evidence-based practices.

Curriculum and Instruction

The program focuses on further development of teacher leaders. The curriculum includes areas of human development, learning, foundations of education, school curriculum, assessment, and further study in areas of interest. Candidates choosing this option for an M.S. degree must also complete a thesis.

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.

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.

In addition to the Graduate School's required application materials, the **Teacher Licensure Option** requires:

1. Hold a bachelor's degree in a content area related to a teaching major offered at NDSU, including the following: biology, chemistry, earth science, English, French, health, history, mathematics, music, physics, or Spanish. If you hold a different major, consult with program faculty for additional information.
2. Compose a 400-500 word original essay that answers the following questions:
   a. What are your reasons for applying to the Teacher Licensure program?
   b. How do your 20 hours working with youth support your decision to apply to the Teacher Licensure program?

3. Pass the Praxis Core Academic Skills exam, meeting ND cut scores in reading, writing and math.
4. Complete 20 hours working with youth. Verification forms are provided in the application system.

In addition to the Graduate School's required application materials, the **Content Focused Options and Curriculum & Instruction** 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 the Graduate School's required application materials, the **Whole Child Option** requires:

- A statement of experiences and goals using the Components of the Whole School, Whole Community, Whole Child (WSCC) as the framework (https://www.cdc.gov/healthyschools/wscc/components.htm). The statement should:

  1. Be a 500-700 word original essay
  2. Explicitly connect your experiences and career goals to the WSCC components
  3. Explain how NDSU's Education Master's program with a focus in *Whole Child Approaches* will help you achieve your career goals

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.

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 thesis or paper. 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.

Content FOcused option

Code	Title	Credits
Required Courses		**12**
EDUC 750	Reflective Practice and Research in Education	
EDUC 751	Students and Their Learning	
EDUC 752	Curriculum Design and Delivery	
EDUC 753	Managing/ and Monitoring Learning	
Major/Concentration		**18**
Practicum (M.Ed.) or Thesis (M.S.)		**3-6**
EDUC 794	Practicum/Internship (or)	
or EDUC 798	Master's Thesis	
Total Credits		**33-36**

Teacher Licensure Option

Code	Title	Credits
EDUC 651P	Instructional Planning, Methods and Assessment	3
EDUC 661	Introduction to Special Education	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 687P	Student Teaching	9
EDUC 688P	Applied Student Teaching	3
Total Credits		**31**

WHOLE CHILD OPTION

Code	Title	Credits
Required Courses		**18**
HNES 645		
HNES 737	School-wide Physical Activity Promotion	
EDUC 751	Students and Their Learning	
EDUC 790	Graduate Seminar (two 3-credit courses)	
EDUC 794	Practicum/Internship	
Focused Electives		**12**
CNED 712	Counseling Across the Lifespan	
CNED 728	Guidance Administration and Consulting	
CNED 729	Professional K-12 School Counseling	
CNED 890	Graduate Seminar	
EDUC 712	Social, Cultural and Political Dimensions of Schools	
EDUC 724	Advanced Educational Psychology	
EDUC 755	Exceptional Learners in the Secondary School Classroom	
SOC 610	Social Inequality	
Total Credits		**30**

Computer Science Education Option

Code	Title	Credits
Education Core		**12**
EDUC 750	Reflective Practice and Research in Education	
EDUC 751	Students and Their Learning	
EDUC 752	Curriculum Design and Delivery	
EDUC 753	Managing/ and Monitoring Learning	
Computer Science Core		**12**
CSCI 641	Introduction to Computer Science Education	
CSCI 642	Problem Solving in Computer Science Education	
CSCI 643	Introduction to Computer Programming (Introduction to Computer Programming, pending)	
CSCI 644	Data Structures and Algorithms (Data Structures and Algorithms, pending)	
Focused Electives		**6**
Students must also choose two of the following:		
CSCI 605	(Principles in Cyber Security, pending)	
CSCI 650	Cloud Computing	
CSCI 713	Software Development Processes	
CSCI 773	Foundations of the Digital Enterprise	
Capstone Experience		3
EDUC 794	Practicum/Internship (or)	
Total Credits		**33**

Core Faculty

Joe Deutsch, Ph.D.

North Dakota State University, 2007
Research Interests: Physical Education Teacher Education, Youth Sport Coaching

Brandon Foye, Ed.D.
Boston University, 2022
Research Interests: Physical Education Teacher Education, Online Physical Education

Jeanette Hoffman, Ed.D.
University of St. Thomas, 2006

Research Interests: Social Emotional Learning, Social, Emotional, Cultural Competencies, Teacher Preparation

Jenny Linker, Ph.D.
University of Illinois Urbana-Champaign, 2011
Research Interests: Comprehensive School Physical Activity Programs, Physical Education Teacher Preparation

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

Kim Overton, Ph.D.

North Dakota State University, 2008

Justin Pieterick, M.S.
Minnesota State University Moorhead, 2016
Research Interests: Health Education, Teacher Preparation

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

Ashley Baggett, Social Science Education

Rebecca Chatham-Vazquez, English Education

Char Moe, Music Education

Lisa Montplaisir, Biology/STEM Education

Eric Syvertson, Art Education

Educational Leadership

Department Information

- **School of Education Head:**
  Jenny Linker, Ph.D.
- **Department Location:**
  School of Education, FLC 216
- **Department Phone:**
  (701) 231-7101
- **Department Web Site:**
  www.ndsu.edu/edol/ (http://www.ndsu.edu/edol/)
- **Application Deadline:**
  priority deadline December 1, final deadline May 1
- **Credential Offered:**

M.S., M.Ed.

- **English Proficiency Requirements:**
  TOEFL iBT 88, IELTS 6.5, Duolingo 110

The purpose of the Educational Leadership program is to provide professional and/or academic preparation for individuals interested in leadership roles in K-12 and higher education settings. These roles include teacher leaders, mid-level administrators (e.g., school principal or higher education administrators), and upper-level administrative positions such as district superintendents.

Degrees offered include a 32-credit Master of Education (M.Ed.) in Educational Leadership – K-12 Leadership and a 36-credit Master of Education (M.Ed.) or Master of Science (M.S.) in Educational Leadership - Higher Education Administration.

K-12 Leadership

The K-12 Leadership option is designed to transform your passion for education using the professional and organizational skills necessary for leadership that focuses on student success. Graduates from this program have the knowledge, skills, and experiences to lead others through informed decision-making and collaboration.

The K-12 Leadership program is accredited by the National Council for Accreditation of Teacher Education (NCATE) and approved by the North Dakota Education Standards and Practices Board. Changes in national and state legislation, standards, or rules can affect academic program requirements

Higher Education Administration

The Higher Education Administration option is designed to provide the foundations of practice, research and theory of higher education and student affairs essential for leadership in post-secondary contexts. Graduates from this program have the knowledge, skills, and experiences to become change-agents on college and university campuses.

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met. Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission. After being accepted for graduate study in the School of Education, the student should contact her/his assigned adviser assigned for assistance in filing a plan of study for consideration by the program.

Please note, the priority deadline for this program is February 1 with a final deadline of April 1. This means that your application must be submitted AND all supplemental materials, such as official transcripts and recommendations, received at the Graduate School by that date.

Required application materials are as follows:

Master of Education (M.Ed.) or the Master of Science (M.S.) in Educational Leadership

- Official transcripts of all previous collegiate work, including one verifying graduation with a bachelor's degree from an accredited institution;
- A cumulative baccalaureate GPA of 3.0 on a 4.0 scale;
- Resume including credentials, licenses and certificates;
- Two references that evaluate the applicant's potential for success as a graduate student in the chosen master's degree program and as an educational leader; and
- A leadership essay.

The Master of Science (M.S.) and the Education Specialist (Ed.S.) degrees require a master's paper or thesis. The Master of Education (M.Ed.) degree is a non-thesis, practitioner-oriented degree. Programs vary in their requirements for a written comprehensive exam or a portfolio/oral.

K-12 Leadership Program of Study

Code	Title	Credits
EDUC 703	Research, Measurement and Program Evaluation	
EDUC 712	Social, Cultural and Political Dimensions of Schools	
EDUC 730	Leadership, Planning and Organizational Behavior	
EDUC 731	Educational Law and Policy	
EDUC 732	Curriculum, Instruction and Learning Theory	
EDUC 734	Personal Communication & Ethics	
EDUC 735	Personnel, Supervision and Staff Development	
EDUC 736	Policy and Educational Finance	
EDUC 738	Administration of K-12 Schools	

EDUC 794	Practicum/Internship	
Total Credits		**30**

K-12 Licensure Additional Credits

(Non-transcripted)

Code	Title	Credits
EDUC 738	Administration of K-12 Schools	3
EDUC 794	Practicum/Internship (Will take either Elementary or Secondary Ed focused)	3

Higher Education Program of Study

Code	Title	Credits
Higher Education Core Courses		**12**
EDUC 707	Organization and Administration of Higher Education	
EDUC 708	Higher Education Student Affairs and Enrollment Management	
EDUC 709	Financing Higher Education	
EDUC 807	Diversity and Educational Policy	
or EDUC 808	Empowerment & Transformative Education	
Inquiry Core		**6**
EDUC 703	Research, Measurement and Program Evaluation	
Select one:		
EDUC 702	Statistics In Educational Research	
EDUC 750	Reflective Practice and Research in Education	
EDUC 832	Assessment Techniques for Educational Institutions	
EDUC 871	Planning and Conducting Needs Assessment	
EDUC 884	Program Evaluation Research	
Professional Emphasis Electives		**12**
Required Comprehensive Experience/Culminating Experience		**6**
EDUC 794	Practicum/Internship (M.Ed. Only)	
EDUC 797S	Comprehensive Project	
EDUC 798	Master's Thesis (M.S. Only)	
Total Credits		**36**

Justin Benna, Ph.D.
Assistant Professor
University of New Hampshire, 2018
Research Interests/Areas of Expertise: PK-12 School Leadership; Social and Political Contexts of Schools; Educator Development and Professional Learning

Dean Bresciani, Ph.D.
University Distinguished Professor
University of Arizona, 1996

Amanda Cordova, Ph.D.
Assistant Professor
University of Texas at San Antonio, 2018

Elizabeth Gilblom, Ph.D.
Assistant Professor
Cleveland State University, 2017
Research Interests: Geographic Information Systems, Privatization in Education, Equity in Education, Critical Social Theory

Brent Hill, Ph.D.
Associate Professor
Oklahoma State University, 2011

Research Interests/Areas of Expertise: Monte Carlo Simulations, Educational and Psychological Measurement, Learning Theory, Structural Equation Modeling, Q Methodology, Time Series Analysis

Hollie Mackey, Ph.D.
Associate Professor
Pennsylvania State University, 2010
Research Interests/Areas of Expertise: Socio-cultural Dimensions of Educational Leadership, Indigenous Theory and Methodology, and Educational, Self-Determination

Cailen O'Shea, Ph.D.
Assistant Professor
University of Nebraska-Lincoln, 2020
Research Interests/Areas of Expertise: School Transformation, Innovation for Equitable Education, PK-12 School Leadership, Quantitative Methods

Laura Parson, Ph.D.
Associate Professor
University of North Dakota, 2016
Research Interests/Areas of Expertise: Teaching and Learning in Higher Education (SoTL), Women in Higher Education, Women in STEM, Ethnographic and Discourse Methods of Inquiry

Chris Ray, Ph.D.
Professor
Oklahoma State University, 2007
Research Interests/Areas of Expertise: Institutional Effectiveness, Learning Outcomes Assessment, Instrument Development, Moral Development and Education, College Student Development

Tamara Uselman, Ed.D.
Visiting Associate Professor
North Dakota State University, 2020

Nate Wood, Ph.D.
Associate Professor
University of Minnesota, 2006
Research Interests/Areas of Expertise: Socio-Cultural Issues in Education, Identity, Classroom Community, Wonder-Informed Pedagogy, Maker Education, Educational Research and Evaluation Methods

Electrical and Computer Engineering

Department Information

- **Department Chair:**
  Benjamin Braaten, Ph.D.
- **Graduate Coordinator:**
  Sudarshan Srinivasan, Ph.D.
- **Department Location:**
  101 Electrical Engineering Building
- **Department Phone:**
  (701) 231-7019
- **Department Web Site:**
  www.ndsu.edu/ece/ (http://www.ndsu.edu/ece/)
- **Application Deadline:**
  February 28 for fall and October 15 for spring (openings may be very limited for spring)
- **Credential Offered:**
  Ph.D., M.S., M.Engr.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL ibT 71, IELTS 6, Duolingo 105; To qualify for teaching assistantship TOEFL ibT 100, IELTS 7, Duolingo 125

The Department of Electrical and Computer Engineering offers graduate programs in selected specialty areas leading to the M.Engr., M.S. and Ph.D. in Electrical and Computer Engineering. Current departmental research expertise falls into one of the following areas: Biomedical Engineering,

Communications/Signal Processing, Computer Architecture, Cyber Physical and Embedded Systems, Electromagnetics/Optics, Power/Power Electronics, and VLSI. The ECE Department is also a key contributor to NDSU's Research and Technology Park.

Research Facilities and Equipment

The department is housed in a modern, well-equipped building. Graduate students have access to laboratories, instrument rooms, and computer services ranging from the university computer system to departmental computers. Research facilities include cardiovascular engineering lab, computer architecture lab, digital systems lab, EMI shield room, power and power electronics lab, signal processing and systems lab, and printed circuit lab.

There are three avenues for admittance to the Electrical and Computer Engineering program.

1. The preferred avenue is to contact and work with an NDSU ECE Professor before coming to NDSU, such that the professor recommends you for admittance into the program. Each professor will have different expectations for the amount and type of work he/she will require you to do in order for him/her to recommend you for admittance into the NDSU ECE graduate program. Please look at each faculty's website (https://www.ndsu.edu/ece/people/faculty/)and contact a faculty member working in a research area in which you are interested in pursuing your graduate studies.
2. 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.
3. To be admitted as an ECE M.E. student, you must have a GRE score of at least 145 Verbal and 155 Quantitative and a minimum GPA of 3.0 on your Electrical Engineering or Computer Engineering B.S. degree. The 3.0 minimum GPA admission requirement may be waived for M.E. students with substantial ECE industry experience. The GRE subject area test is not required.

Financial Assistance

The department has a limited number of both teaching and research assistantships available. These assistantships provide a monthly salary during the academic year. In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits. In addition, there are opportunities, both in the department and on the campus, to perform part-time work as graders, teachers, tutors, and consultants. These assistantships are awarded on a competitive basis -- typically at the time of admission for fall semester.

Master of Engineering and Master of Science

The Master of Engineering and the Master of Science degrees require a minimum of 30 semester credits beyond the B.S. degree. The Master of Engineering is a course-work only program requiring a capstone consisting of a portfolio or written exam. For the Master of Science, 6 hours of the 30 must be assigned to the thesis. All students must pass a final oral examination covering both course work, and the thesis.

Ph.D. Program

The Doctor of Philosophy degree requires a minimum of 90 credits beyond the baccalaureate with an overall GPA of 3.0 or higher. Of these 90 credits, a minimum of 36 credits of graduate-level coursework and a minimum of 30 credits of dissertation are required, including ECE 702: Advanced Research Topics, 1 credit.

Academic Good Standing

All graduate students must maintain a 3.00 GPA or better and make significant progress towards their degree to remain in good standing. Failing to do either may hinder the student's financial assistance and/or ability to register for courses in the ECE graduate program.

Omid Beik, Ph.D.
McMaster University, 2016
Research Interests: Power and Energy Systems, Renewable Energy Systems, Power Electronics, Electric Machines, Transportation Electrification

Benjamin Braaten, Ph.D.
North Dakota State University, 2009
Research Interests: Applied Electromagnetics, Electromagnetic Compatibility and Signal Integrity

Farhad Shirani Chaharsooghi, Ph.D.
University of Michigan, 2017
Research Interests: Privacy and Security, Wireless Communications, Information Theory, and Learning Theory

Shuvashis Day, Ph.D.
Monash University, 2018
Research Interests: Microwave Devices and Antennas, Metamaterial and Terahertz Devices, RFID Based Sensing, Chipless RFID Based Tag and Sensor, Internet of Things (IoT), Microwave Sensors for Biomedical Applications, Smart Sensing Materials, Machine Learning

Daniel L. Ewert, Ph.D.

University of North Dakota, 1989
Research Interests: Biomedical Engineering

Sumitha George, Ph.D.
Pennsylvania State University, 2020

Jacob Glower, Ph.D.
The Ohio State University, 1988
Research Interests: Control Systems, Digital Systems

Roger Green, Ph.D.
University of Wyoming, 1998
Research Interests: Signal Processing, Array Processing, Time-frequency Analysis

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

Sudarshan Srinivasan, Ph.D.
Georgia Institute of Technology, 2007
Research Interests: Computer Engineering

Dali Sun, Ph.D.
University of Tokyo
Research Interests: Bioengineering, Electrical Engineering, Software Engineering

Umamaheswara Rao Tida, Ph.D.
University of Notre Dame, 2019
Research Interests: Device- and System-Level Modeling and Design of 3-D Integrated Systems, Machine Learning Design Frameworks, Hardware Design for Edge Computing, Power Delivery Networks and, Low-Power Circuit Designs

Danling Wang, Ph.D.
University of Washington, 2013
Research Interest: Development of Sensor Devices Based on Novel Nanostructured Materials and Advanced Techniques. Focusing on Sensor Design, Fabrication, and Application of Early-Stage Human Disease Monitoring and Diagnosis, Such as Breath Analyzer for Diabetes; Industrial, and Military Safety, Such as Environmental Explosive or Toxic Gas Detection

Di Wu, Ph.D.
Polytechnic University of Turin, 2011
Zhejiang University
Research Interests: Renewable Energy Integration, Application of Complex Network Theory in Power Grids, Cascading Failure Analysis, Power System Dynamics and Stability

Qifeng Zhang, Ph.D.
Peking University, 2001
Research Interests Electric Materials and Devices for Energy Conversion and Storage, involving Solar Cells, Lithium Batteries, and Solid State Electrolytes; Nanomaterials for Sensor and Biomedical Applications; and Nanotechnology

English

Department Information

- **Department Chair:**
  Sean Burt, Ph.D.
- **Graduate Coordinator:**
  Alison Graham-Bertolini, Ph.D.

- **Department Location:**
  318 Minard Hall
- **Department Phone:**
  (701) 231-7143
- **Department Web Site:**
  www.ndsu.edu/english/ (http://www.ndsu.edu/english/)
- **Application Deadline:**
  Application review begins Feb. 1 and continues until all spots are filled.
- **Credential Offered:**
  M.A.
- **English Proficiency Requirements:**
  TOEFL iBT 100; IELTS 7; PTE Academic 68; Duolingo 125

Master of Arts

Our program encourages individuality and collaboration as it prepares candidates for careers both within academia and beyond. Graduates have gone on to top-tier Ph.D. programs or opted to work in industry or for national and local nonprofits.

Admissions Requirements

Graduate studies in English is open to all qualified applicants who hold a Bachelor of Arts or a Bachelor of Science in English or a related field from an accredited college or university.

Financial Assistance

Graduate teaching assistantships are available and are awarded on the basis of the applicant's scholastic record, letters of recommendation, and the student's letter of interest. All students admitted full-standing are eligible for an assistantship in the Department of English. Letters of interest (if applicable) for teaching assistantships should be submitted at the same time that the application to the program is submitted to the Graduate School and should address prior experience and qualifications.

Graduate teaching assistantships are awarded for the academic year only. In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

Moreover, the Department of English annually awards the Richard L. Johnson Endowed Graduate Fellowship, The Rooney Scholarship and the Madeline S. Giddings Scholarship.

The Master of Arts program consists of 27 credit hours of letter-graded course work with an overall GPA of 3.0 or better, and (at least) a 3 credit Master's Paper. Note that ENGL 764 Teaching Workshop for Writing Instructorsis required of all GTAs who have not taken a similar class elsewhere.

Code	Title	Credits
Core Courses		**9**
ENGL 755	Composition Theory	
ENGL 760	Graduate Scholarship	
ENGL 762	Critical Theory	
Rhetoric/Writing/Linguistics		**6**
Literature		**6**
Other/Electives		**6**
ENGL 797	**Master's Paper**	**3**
Total Credits		**30**

Anastassiya Andrianova, Ph.D.
City University of New York, 2011
Field: British Romantic and Victorian Literature, Drama, Translation, Pedagogy, Postcolonial Literature, Slavic Literature, Animal Studies

Lisa R. Arnold, Ph.D.
University of Louisville, 2011
Field: Rhetoric and Composition, Writing Program Administration, History of Writing Instruction

Sean Burt, Ph.D.
Duke University, 2009

Field: Ancient Jewish Literature, Genre Theory, Ancient Hebrew Poetry, Poetics, Horror Literature & Theory

Adam Goldwyn, Ph.D.
City University of New York, 2010
Field: Medieval Studies, Medieval Greek World, Influence of Ancient Greek Culture in the Middle Ages

Amy Gore, Ph.D.
University of New Mexico, 2019
Field: Early Indigenous and American literatures, Book history, Gothic literature, Body studies, and the Recovery of marginalized women and Native American writers

Alison Graham-Bertolini, Ph.D.
Louisiana State University, 2009
Field: Contemporary American Literature, Literature of the Southern United States, Women's Literature, Contemporary Ethnic and Postcolonial Literature

Daniel Kenzie, Ph.D., Affiliated Faculty
Purdue University, 2017
Rhetoric & Composition, Professional & Technical Writing, Rhetoric of Health & Medicine, Disability Studies

Verena Theile, Ph.D.
Washington State University, Pullman, 2006
Field: 16th/17th Century Literature, Shakespeare, Early Modern Drama, European Literature, Literary Theory, Science Fiction and Fantasy, Film and Adaptation Studies

Emeritus Faculty

Linda L. Helstern, Ph.D., Emerita
Southern Illinois University-Carbondale, 2001
Field: Native American Literature, Modernism, Contemporary Poetry, Literature and the Environment

R.S. Krishnan, Ph.D., Emeritus
University of Nebraska, 1981
Field: Restoration and 18th-Century British Literature, Postmodern Theories, British Novel, Postcolonial Literature

Bruce Maylath, Ph.D., Emeritus
University of Minnesota, 1994
Field: International Technical Communication, Rhetoric and Composition, Linguistics

Robert O'Connor, Ph.D., Emeritus
Bowling Green State University, 1979
Field: Romantic Literature, Science Fiction and Fantasy

Dale Sullivan, Ph.D., Emeritus
Rensselaer Polytechnic Institute, 1988
Field: Rhetoric Theory and History, Rhetoric of Science, Rhetoric of Religion, Technical Communication

Enterprise Resource Planning

Department Information

- **Program Coordinator:**
  Elizabeth Worth
- **Email:**
  elizabeth.worth@ndsu.edu
- **Department Location:**
  Barry Hall/Quentin Burdick Building
- **Department Phone:**
  (701) 231-7767
- **Department Web Site:**
  www.ndsu.edu/business/programs/graduate/mscm/ (http://www.ndsu.edu/business/programs/graduate/mscm/)
- **Credential Offered:**
  Graduate Certificate

SAP is the leading global provider of Enterprise Resource Planning (ERP) software. More than 200,000 organizations around the world use SAP software to streamline the management of their business processes. More than 80% of Fortune 1000 companies use SAP to integrate their business activities. To best use their SAP solutions, organizations need people with ERP knowledge and skill to drive business processes effectiveness and efficiency.

Curriculum

Code	Title	Credits
TL 715	Introduction to ERP	3
TL 725	ERP Configuration	3
TL 735	Practical Data Analytics	3
Total Credits		**9**

Raj Bridgelall, Ph.D.
North Dakota State University, 2015
Research Interests: Big Data Analytics, Internet-of-Things (IoT), Cloud Computing; Connected and Autonomous Vehicles (CAV), Shared Mobility, Intelligent Transportation Solutions; Signal Processing and Mathematical Modeling of Transportation Systems; Remote Sensing with Unmanned Aircraft Systems; Hyperspectral Image Analysis; Radio Frequency Identification (RFID); Real-Time Locating Systems (RTLS); Energy Harvesting and Massive Scale Autonomous Wireless Sensor Networks
Department: Transportation, Logistics, and Finance

Robert Froberg, Ph.D.
North Dakota State University, 2019
Research Interests: Transport of Rolling Stock, Equipment, and Supplies to Austere Locations, Austere Environment Sustainment Planning, Transportation Analysis and Planning for Logistics, Supply Chain Planning, Assessment, and Optimization Leveraging (Big) Data, Modeling of Supply Chains and Transportation Networks
Department: Transportation, Logistics, and Finance

Ranjit Godavarthy, Ph.D.
Kansas State University, 2012
Research Interests: Public Transportation in Small Urban and Rural Areas, Demand Response Transit and Paratransit, Bike Share, Roundabouts, Traffic Engineering and Operations, Transportation and Highway Safety
Department: Transportation, Logistics, and Finance

Pan Lu, Ph.D.
North Dakota State University, 2011
Research Interests: Connected and Autonomous Vehicles, Smart Material and Structure Health Monitoring, Big Data Analytics for Transportation, Smart Transportation, Transportation System, Asset Management, Multimodal Transportation, Geospatial Transportation Modeling
Department: Transportation, Logistics, and Finance

Jeremy Mattson, Ph.D.
North Dakota State University, 2017
Research Interests: Public Transportation, Transportation Economics, Demand Modeling, Travel Behavior, Built Environment
Department: Transportation, Logistics, and Finance

Diomo Motuba, Ph.D.
North Dakota State University, 2009
Research Interests: Transportation and Land Use Planning, Freight Modeling, Transportation Economics, Connected Automated Vehicles, Logistics and Supply Chain Management, Transportation Safety
Department: Transportation, Logistics, and Finance

Tim O. Peterson, Ph.D.
Texas A&M University, 1988
Research Interests: Managerial Leadership, Application of Information Technology to Organizational Issues, Scholarship of Teaching
Department: Management and Marketing

Fred Riggins, Ph.D.
Carnegie Mellon University, 1994
Research Interests: Economics of Information Systems, Interorganization Systems, Adoption of New Technology, Radio Frequency Identification (RFID), Internet-of-Things (IoT), Blockchain, Cryptoeconomics, Information and Communication Technology in Microfinance
Department: Accounting and Information Systems

Robert Swearingen, Ph.D.

North Dakota State University, 2019
Research Interests: Change Management in Supply Chain Organizations, Lean Inventory Management Process Improvement Supported by Value Stream Mapping, Enterprise Information Systems Supporting Supply Chain Management
Department: Transportation, Logistics, and Finance

Joseph Szmerekovsky, Ph.D.
Case Western Reserve University, 2003
Research Interests: Project Management and Scheduling, Supply Chain Management and Technology, Energy Supply Chain Management, Healthcare Logistics
Department: Transportation, Logistics, and Finance

Denver Tolliver, Ph.D.
Virginia Polytechnic Institute and State University, 1989
Research Interests: Highway Systems Modeling, Multimodal Transportation Planning, Freight Transportation, Energy and Environmental Analysis
Department: Transportation, Logistics, and Finance

Environmental and Conservation Sciences

Department Information

- **Program Director:**
  Craig Stockwell, Ph.D.
- **Department Location:**
  Biological Sciences, Stevens 119
- **Department Phone:**
  (701) 231-7717
- **Department Web Site:**
  www.ndsu.edu/ecs/ (http://www.ndsu.edu/ecs/)
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring semester. Domestic applicants should apply at least one month prior to the start of classes.
- **Credential Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

The graduate program leading to an M.S. or a Ph.D. in Environmental and Conservation Sciences (ECS) rests on an integrative curriculum and a multidisciplinary team approach. The program emphasizes the common ground shared by all sciences, and seeks to bridge methodological and philosophical boundaries that might hinder interdisciplinary communication and cooperation. The program offers three tracks: Environmental Science, Conservation Biology and Environmental Social Sciences. The Environmental Science track focuses on abiotic environmental issues, such as water, air, and land pollution. The Conservation Biology track focuses on biotic issues, such as the preservation of biodiversity and ecosystem function. The Environmental Social Sciences track emphasizes environmental economics and policy.

The interdisciplinary nature of this program is reflected by the participation of faculty from across the campus, including the Colleges of Agriculture, Food Systems, and Natural Resources; Arts, Humanities, and Social Sciences; Engineering; and Science and Mathematics.

Environmental Science

Areas of Environmental Science, such as climate change, groundwater, hazardous waste, and water chemistry, require broad training across discipline lines for successful application. To better predict anthropogenic environmental impacts, the engineering, earth material, chemical, and biological data must be considered in an integrated manner.

Conservation Biology

Conservation Biology focuses on the loss of regional and global biodiversity, but considers the human element as well in its approach to resource issues. As an example, conservation genomics, community ecology, invasion ecology, endangered species management, and human-wildlife conflicts are themes for ECS Graduate Students.

Environmental Social Sciences

Environmental Social Sciences focuses on Natural Resources Economics; Environmental Economics as related to Environmental policy.

Admissions Requirements

To be admitted to the Environmental and Conservation Sciences program, the applicant must meet the Graduate School requirements. Further, applicants are **only considered after an ECS affiliated faculty member has agreed to to admit the student to her/his lab and make arrangements of stipend and research funding**. Thus, applicants should contact ECS faculty members who share their research interests. https://www.ndsu.edu/ecs/index.php/people/faculty (https://www.ndsu.edu/ecs/index.php/people/faculty/)

Financial Assistance

The applicant should contact a prospective mentor to identify sources of financial aid. Teaching and research assistantships may be available through funded research or participating departments. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. Contact the office of Financial Aid and Scholarships for information and applications regarding scholarships.

Program Administration

The graduate program is administered by the ECS Steering Committee. The committee is composed of ECS graduate faculty members representing the participating colleges: Agriculture, Food Systems, and Natural Resources; Engineering; and Science and Mathematics. The committee also includes a student member which is nominated annually by the ECS Graduate Student Association.

The ECS Program Director presides over ECS Steering Committee meetings. The duties of the ECS Steering Committee include:

1. review of requests to join the ECS faculty and
2. program review and administration.

By the end of the second semester, the student and academic adviser will arrange for the appointment of a Graduate Supervisory Committee. For Ph.D. study, the Graduate Supervisory Committee will consist of at least four members of the NDSU graduate faculty. The committee must include the student's adviser, two additional ECS faculty members, and a Graduate School representative. One committee member must be from outside the student's home college.

For M.S. study, the Graduate Supervisory Committee will consist of at least three members of the NDSU graduate faculty and will include the student's adviser, an ECS faculty member and a faculty from outside the student's home college. The plan of study will be prepared by the student, in consultation with the major adviser, by the end of the first year in residence.

Master of Science in Environmental and Conservation Sciences

The total credits will be not less than 30 graduate credits, with at least 16 credits of graduate courses numbered 601-689, 691; 700-789, 791 or 800-889, 891 plus the ECS graduate seminar for 1 credit, and research credits (798) not fewer than 6 nor more than 10 thesis credits. The didactic credits must include at least 1 ECS cross-disciplinary course; 1 ECS track course and UNIV 720 Scientific Integrity. All M.S. students must complete a thesis and pass a final examination as described in The Graduate School Policies section of the Graduate Bulletin. An overall GPA of 3.0 or better must be maintained.

Doctor of Philosophy in Environmental and Conservation Sciences

Each Ph.D. student will complete at least 27 credits of didactic courses plus the ECS graduate seminar for 1 credit. The didactic courses will include: 3 core courses (9 credits), UNIV 720 Scientific Integrity, a minimum of 14-15 credits from a chosen track, and 2-3 credits of electives from another track or other NDSU courses numbered 601-689, 691; 700-789, 791 or 800-889, 891. The 15 track credits must be from at least 2 course categories. Two of the three courses must come from outside of the student's chosen track. Of the 27 didactic course credits, a total of 15 must be at the 700-800 level. A total of 90 credits are required.

For students entering the program with a Master's Degree or previous graduate coursework, up to 12 credits of previous graduate work can transfer and be counted toward the 27 credits. Such transferred credits must be approved by the student's supervisory committee, the program director and the Graduate Dean. The student must earn no fewer than 60 graduate credits at NDSU. Of these, no fewer than 15 credits must be at the 700 or 800 level (700-789, 791; 800-889 and 891).

Program Requirements

Code	Title	Credits
Environmental Social Sciences Track		
ECON 681	Natural Resource Economics	3
ECS 770	Environmental Law and Policy	3
HIST 634	Environmental History	3
or HIST 710	Research Seminar in North American History	
or HIST 780	Readings in World History	
NRM 631	National Environmental Policy Act & Environental Impact Assessment	3

NRM 702	Natural Resources Management Planning	3
SOC 631	Environmental Sociology	3
Environmental Sciences Track		
CE 770	Hazardous Waste Site Remediation	3
GEOL 614	Hydrogeology	3
MICR 652	Microbial Ecology	3
PH 720	Environmental Health	3
Conservation Biology Track		
BOT 862		3
BOT 864		3
ZOO 675		3
ZOO 850		

CONSERVATIVE BIOLOGY TRACK - TOTAL 18 CREDITS

Code	Title	Credits
Biodiversity		
Select 3-9 credits of the following:		
BIOL 681	Wetland Science	
BOT 717		
ENT 750	Systematic Entomology	
RNG 716	Agrostology	
ZOO 650		
ZOO 652		
ZOO 654		
ZOO 658		
Ecology and Evolution		
Select 3-9 credits of the following:		
BIOL 850	Advanced Ecology	
BIOL 859	Evolution	
BOT 660		
BOT 862		
BOT 864		
ENT 765		
ENT 770	Writing a Scientific Literature Review	
GEOL 640		
MICR 652	Microbial Ecology	
PLSC 631	Intermediate Genetics	
PLSC 751	Advanced Plant Genetics	
PLSC 781		
RNG 765	Analysis Of Ecosystems	
SOIL 610	Soils and Land Use	
SOIL 647	Microclimatology	
ZOO 662		
ZOO 670		
ZOO 850		
ZOO 860		
ZOO 870		
Human Dimensions and Management		
Select 3-9 credits of the following:		
ANTH 662	Anthropology and the Environment	
COMM 783	Advanced Organizational Communication I	
CE 678	Water Quality Management	

ECON 682	Environmental Economics
POLS 642	Global Policy Issues
POLS 650	Politics of the Developing Countries
RNG 656	Ecological Restoration
ZOO 675	
ZOO 676	
ZOO 677	
ZOO 850	
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	
STAT 661	Applied Regression Models
STAT 662	Introduction to Experimental Design
STAT 663	Nonparametric Statistics
STAT 665	Meta-Analysis Methods
STAT 670	Statistical SAS Programming
STAT 730	Biostatistics
STAT 761	Advanced Regression
STAT 770	Survival Analysis

ENVIRONMENTAL SCIENCES TRACK-TOTAL 17 CREDITS

Code	Title	Credits
Water Sciences		
Select 3-9 credits of the following:		
ABEN 664	Resource Conservation and Irrigation Engineering	
ABEN 765	Small Watershed Hydrology and Modeling	
CE 610	Water & Wastewater Engineering	
CE 677	Applied Hydrology	
CE 676	Watershed Modeling	
CE 678	Water Quality Management	
CE 679	Advanced Water and Wastewater Treatment	
CE 776	Ground Water and Seepage	
CE 779	Watershed Water Quality Modeling	
CE 796	Special Topics	
GEOL 640		
ZOO 670		
Soil and Solid Waste		
Select 3-9 credits of the following:		
ABEN 696	Special Topics	
CE 672	Solid and Hazardous Waste Management	
CE 770	Hazardous Waste Site Remediation	
SOIL 610	Soils and Land Use	
SOIL 633	Soil Ecohydrology and Physics	

SOIL 733	Advanced Soil Nutrient Cycling
Environmental Management	
Select 3-9 credits of the following:	
CE 672	Solid and Hazardous Waste Management
CE 678	Water Quality Management
COMM 783	Advanced Organizational Communication I
RNG 656	Ecological Restoration
ZOO 675	
ZOO 676	
ZOO 677	
Research Tools	
Select 3-9 credits of the following:	
ABEN 682	Instrumentation & Measurements
ABEN 696	Special Topics
CE 677	Applied Hydrology
GEOG 655	Introduction to Geographic Information Systems
GEOG 656	Advanced Geographic Information Systems
GEOL 660	Biogeochemistry
GEOL 760	Advanced Biogeochemistry
IME 660	Evaluation of Engineering Data
RNG 650	Range Plants
STAT 662	Introduction to Experimental Design
STAT 725	Applied Statistics
STAT 761	Advanced Regression

ENVIRONMENTAL AND SOCIAL SCIENCES TRACK-TOTAL 17 CREDITS

Code	Title	Credits
Social Science Theory		
Select 3-9 credits of the following:		
AGEC 741	Advanced Microeconomics	
ANTH 680	Development of Anthropological Theory	
COMM 711	Communication Theory	
ECON 640	Game Theory and Strategy	
POLS 720		
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		
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		
Management Techniques		
Select 3-9 credits of the following:		

COMM 783	Advanced Organizational Communication I
GEOL 660	Biogeochemistry
NRM 631	National Environmental Policy Act & Environental Impact Assessment
NRM 632	
NRM 653	Rangeland Resources Watershed Management
NRM 701	Terrestrial Resources Management
NRM 702	Natural Resources Management Planning
RNG 654	Wetland Resources Management
RNG 656	Ecological Restoration
SOC 604	Community Assessment
TL 755	City Logistics
ZOO 675	
ZOO 676	
ZOO 850	
Research Tools	
Select 3-9 credits of the following:	
AGEC 701	Research Methods
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	
ENGL 656	Literacy, Culture and Identity
ENGL 758	Topics in Rhetoric, Writing, and Culture
GEOG 655	Introduction to Geographic Information Systems
GEOG 656	Advanced Geographic Information Systems
PSYC 640	Experimental Methods
RNG 652	Managing Natural and Rangeland Resources using GIS
RNG 765	Analysis Of Ecosystems
SOC 700	Qualitative Methods
SOC 701	Quantitative Methods
STAT 660	Applied Survey Sampling
STAT 661	Applied Regression Models
STAT 662	Introduction to Experimental Design
STAT 663	Nonparametric Statistics
STAT 665	Meta-Analysis Methods
STAT 670	Statistical SAS Programming
STAT 725	Applied Statistics
STAT 726	Applied Regression and Analysis of Variance
STAT 730	Biostatistics
STAT 761	Advanced Regression
STAT 770	Survival Analysis

Preliminary Examinations for Doctoral Students

The written preliminary examination will cover the core areas for ECS and each of the core topic areas for the appropriate track. The preliminary examination will typically be taken in the middle of the third year. The written exam must be passed before the comprehensive oral examination can be scheduled.

The comprehensive oral examination will be taken no later than the end of the third year in residence. The examination will cover the topic areas for the appropriate track.

Dissertation Research

A proposal describing research suitable for preparation of a dissertation in Environmental and Conservation Sciences will be prepared in the format of a NSF Dissertation Improvement Grant. Alternative formats must be agreed to by the Graduate Supervisory Committee. The proposal will be submitted to the student's Graduate Supervisory Committee for review and approval. The dissertation must show originality and demonstrate the student's capacity for independent research.

Bakr Aly Ahmed, Ph.D.
Virginia Tech, 2001
Research Interests: Built Environment; Sustainable Architecture; Construction Technology; Urban Sustainability

Laura Aldrich-Wolfe, Ph.D.
Cornell University, 2006
Research Interests: Restoration Ecology; Conservation Biology; Fungal Community Ecology

F. Adnan Akyuz, Ph.D.
University of Missouri-Columbia, 1994
Research Interests: Applied Climatology and Microclimatology/Climate Based Agriculture

Allan C. Ashworth, Ph.D.
University of Birmingham, 1969
Research Interests: Quaternary Paleoecology, Paleoclimatology

Achintya Bezbaruah, Ph.D.
University of Nebraska-Lincoln, 2002
Research Interests: Nanomaterials for Pollution Control, Recalcitrant and Micro Pollutants, Contaminant Fate and Transport, Small Community Water and Wastewater Treatment, Environmental Sensors, Environmental Management

Julia Bowsher, Ph.D.
Duke University, 2007
Research Interests: Evolutionary and Developmental Biology

Igathinathane Cannayen, Ph.D.
Indian Institute of Technology, 1997
Research Interests: Biomass Harvest, Storage, Collection and Pre-Processing

Frank X.M. Casey, Ph.D.
Iowa State University, 2000
Research Interests: Field and Laboratory Studies of Water Flow and Chemical Transport Processes

Amitava Chatterjee, Ph.D.
University of Wyoming, 2007
Research Area/Activity: Soil Fertility Management, Greenhouse Gas Emissions

Xuefeng (Michael) Chu, Ph. D.
University of California, Davis, 2002
Research Interests: Watershed Hydrologic and Environmental Modeling, Overland Flow and Infiltration, Integrated Modeling of Flow and Contaminant Transport

Larry Cihacek, Ph.D.
Iowa State University, 1979
Research Interests: Carbon Sequestration in Soils, Soil Physical Properties, Soil Management for Waste Disposal

Dennis Cooley, Ph.D.
University of Rochester, 1995
Research Interests: Ethics of Science

Aaron Daigh, Ph.D.
Iowa State University, 2013
Research Interests: Soil Physics, Transport in Soils, Soil Residue and Water Management, Crop Rotations, and Nutrient/Agrochemical/Industrial Byproduct Soil Amendment Impacts on Soil Physical Properties

Stephanie Day, Ph.D.

University of Minnesota, 2012
Research Interests: Fluvial Geomorphology, Slope Stability, Geospatial Sciences

Edward (Shawn) DeKeyser, Ph.D.
North Dakota State University, 2000
Research Interests: Wetland Ecology, Wetland Assessment and Monitoring, Invasive Species Ecology and Management, Native Prairie Restoration

Anne Denton, Ph.D.
University of Mainz, 1996
Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Educational Technology, Model Building, Databases

Thomas M. DeSutter, Ph.D.
Kansas State University, 2004
Research Interest: Trace Gas Fluxes, Inorganic Soil Chemistry, Soil Environmental Conditions

Ned Dochtermann, Ph.D.
University of Nevada, Reno, 2009
Research Interests: Ecological and Evolutionary Causes and Consequences of Phenotypic Variation

Paulo Flores, Ph.D.
Federal University of Rio Grande do Sul, 2008
Research Interests: Precision Agriculture, Unmanned Aerial Systems; Imagery analyses

Caley Gasch, Ph.D.
University of Wyoming, 2013
Research Interests: Soil ecology; Restoration; Conservation

Erin Gillam, Ph.D.
University of Tennessee, 2007
Research Interests: Behavioral ecology of bats, ecological and evolutionary basis of behavior in all animal groups, behavioral, ecological, and evolutionary factors influence the structure of animal communication signals and wildlife ecology and conservation.

Kendra Greenlee, Ph.D.
Arizona State University-Tempe, 2004
Research interests: Environmental and respiratory physiology of insects; insect immunology.

Timothy Greives, Ph.D.
Indiana University, 2009
Research Interests: Physiology and Behavior of Animals in Response to Environmental Signals

Ademola (Demmy) Hammed, Ph.D.
International Islamic University, 2014
Research Interests: Biotechnology Engineering; Agricultural Bioproducts

Jason Harmon, Ph.D.
University of Minnesota, 2003
Research Interests: Environmental change; ecosystem services; population and community ecology

Mark Harvey, Ph.D.
University of Wyoming, 1986
Research Interests: American West, Environmental History, Public History

Harlene Hatterman-Valenti, Ph.D.
Iowa state University, 1993
Research Interests: High-Value Crop Production

Robert R. Hearne, Ph.D.
University of Minnesota, 1995
Research Interests: Economic Analysis of Emerging Environmental and Resource Issues in the Northern Great Plains

Britt Heidinger, Ph.D.
Indiana University, 2007
Research Interests: Physiological Ecology, Senescence, Stress Physiology

David Hopkins, Ph.D.
North Dakota State University, 1997

Research Interests: Soil Formation and Chemistry

Tom Isern, Ph.D.
Oklahoma State University, 1977
Research Interests: History of Agriculture, History of Great Plains

Sivaguru Jayaraman, Ph.D.
Tulane University, 2003
Research Interests: Photocatalysis, Photochemistry, Green Chemistry

Xinhua Jia, Ph.D.
University of Arizona, 2004
Research Interests: Evapotranspiration, Subsurface drainage and Water quality

Dinesh Katti, Ph.D.
University of Arizona, 1991
Research Interests: Geotechnical Engineering, Constitutive Modeling of Geologic Materials, Expansive Soils, Multiscale Modeling, Steered Molecular Dynamics, Computational Mechanics, Nanocomposite, and Bio-nanocomposites. Computational Biophysics

Page Klug, Ph.D.
Kansas State University, 2009
Research Interests:Human-wildlife Interactions; Ecology; Birds; Snakes

Ben Laabs, Ph.D.
University of Wisconsin, 1999
Research Interests: Quaternary Geology; Glacial Geology; Cosmogenic Nuclides; Paleoclimate; Surface Processes

Trung Le, Ph.D.
University of Minnesota, 2011
Research Interests: Hydraulics; Fluid Mechanics; Numerical Methods For Fluid-Structure Interaction

Kenneth E. Lepper, Ph.D.
Oklahoma State University, 2001
Research Interests: Quaternary Geology and Age Dating

Wei Lin, Ph.D.
State University of New York at Buffalo, 1992
Research Interests: Water and Wastewater Treatment, Hazardous Waste Management

Zhulu Lin, Ph.D.
University of Georgia, 2003
Research Interests: Surface and Subsurface Hydrology and Modeling, Soil and Water Resources Management, Environmental Systems Analysis, Risk Identifications and Assessment, Geostatistics and Spatial Statistics

Guodong Liu, Ph.D.
Hunan University, 2001
Research Interests: Synthesis of Novel Nanomaterials, Biosensors, Bioassays

John McEvoy, Ph.D.
University of Ulster Northern Ireland, 2002
Research Interests: Cryptosporidium Virulence Factors and Mechanisms of Pathogenesis

Jennifer Momsen, Ph.D.
Rutgers University, 2007
Research Interests: Biology Education, Systems Thinking in Introductory Biology, Visualization, Assessing the Cognitive Level of STEM Courses

Bakr Mourad Aly Ahmed, Ph.D.
Virginia Tech., 2001
Research Interests: Sustainability Indicators and Implementation, Carrying Capacity Measurements, Coastal Development, Built Environment and Natural Resources Conservation

Jack Norland, Ph.D.
North Dakota State University, 2008
Research Interests: Restoration Ecology, Application of Remote Sensing to Natural Resource Management, Study of Natural Resources Management Problems in a Socio-ecological Setting

Nurun Nahar, Ph.D.
North Dakota State University, 2017
Research Interests: Biomass Conversion; Bioprocess Engineering; Biofuels

Peter Oduor, Ph.D.
University of Missouri - Rolla, 2004
Research Interests: Geographic Information Systems, Groundwater Flow Modeling, Groundwater Contamination

Marinus Otte, Ph.D.
Vrije Universiteit, 1991
Research Interests: Wetland ecology, Biogeochemistry, Ecophysiology and Ecotoxicology

Birgit Pruess, Ph.D.
Ruhr- Universitat Bochum, 1991
Research Interest: Microbial Physiology and Gene Regulation

Scott Pryor, Ph.D.
Cornell University, 2005
Research Interests: Biofuel Production from Cellulosic Feedstocks, Biobased Chemicals and Materials, Bioprocess Engineering, Process Optimization, Solid State and Liquid Fermentation Systems

Shafiqur Rahman, Ph.D.
University of Manitoba, 2004
Research Interests: Animal Waste Management, Biosolids Management, Air Quality, Water Quality, Composting

David A. Rider, Ph.D.
Louisiana State University, 1988
Research Interests: Insect Systematics, Biodiversity

David Ripplinger, Ph.D.
North Dakota State University, 2012
Research Interests: Energy Transport; Agricultural Economics

David C. Roberts, Ph.D.
Oklahoma State University, 2009
Research Interests: Evaluation and Design of Economically Efficient Tools and Policies for Pollution Control, Economic Valuation of Environmental and Ecological Attributes Through Revealed and Stated Preference Methods, Valuation of Environmental Risk, and Low-Impact and Precision Agriculture

Bernhardt Saini-Eidukat, Ph.D.
University of Minnesota, 1991
Research Interests: Environmental Geochemistry, Igneous Petrology, Economic Geology

Kalidas Shetty, Ph.D.
University of Idaho, 1989

Research Interests: Plant Science; Agriculture; Food Science; Human Nutrition; Public Health

Halis Simsek, Ph.D.
North Dakota State University, 2012
Research Interests: Bioenvironmental Engineering

Senay Simsek, Ph.D.
North Dakota State University, 2012
Research Interests: Bioenvironmental Engineering; Carbohydrate Chemistry; Cereal Science; Food Science And Technology

Todd Sirotiak, Ph.D.
Iowa State University
Research Interests: Construction Process Improvement; Sustainability

Matt Smith, Ph.D.
University Of Arkansas, 2012
Research Interests: Morphology; Physiological Ecology

Dean D. Steele, Ph.D.
University of Minnesota, 1991

Research Interests: Irrigation and Environmental Engineering

Craig A. Stockwell, Ph.D.
University of Nevada, 1995
Research Interests: Conservation Biology, Evolutionary Ecology of Native Fishes, Human-Wildlife Interactions

Linda Tackett, Ph.D.
University of Southern California, 2014
Research Interests: Norian (and Mesozoic, generally) Paleoecological, Taxonomic, and Environmental Dynamics

Steve E. Travers, Ph.D.
University of California, 1998
Research Interests: Plant Evolutionary Ecology

Cheryl Wachenheim, Ph.D.
Michigan State University, 1994
Research Interests: Eliciting Perceptions and Valuations from Consumers, Firms, Students and Other Stakeholders and Decision Makers

Alexander Wagner, Ph.D.
Oxford University, 1997
Research Interests: Lattice Boltzmann, Spinodal Decomposition, Viscoelasticity, Drop Deformation and Break-up in a Shear Flow, Wetting, Non-equilibrium Thermodynamics, Complex systems

Scott Wood, Ph.D.
Princeton University, 1985
Research Interests: Environmental Geochemistry, Radioactive Waste Disposal

Brian D. Wisenden, Ph.D.
University of Western Ontario, 1993
Research interests: Behavioral Ecology of Fishes, Chemical Ecology of Predator-Prey Interactions, Parental Care and Mating Systems

Environmental Engineering

Department Information

- **Interim Department Chair:**
  Xuefeng (Michael) Chu, Ph.D.
- **Graduate Program Coordinator:**
  Kalpana Katti, Ph.D.
- **Department Location:**
  201 Civil and Industrial Engineering Bldg.
- **Department Phone:**
  (701) 231-7244
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Credential Offered:**
  M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Civil and Environmental Engineering offers the M.S. degree in environmental engineering and M.S. and Ph.D. degrees in civil engineering. Also, the College of Engineering offers a program leading to a Ph.D. degree in engineering in which civil engineering is a possible area of specialization. The department also participates in several interdisciplinary programs such as Environmental and Conservation Sciences, Materials & Nanotechnology and Transportation and Logistics.

The graduate curriculum in environmental engineering offers courses designed to prepare the student with engineering fundamentals as applied to the environment. To complement the major area of study, additional courses are often selected from other disciplines. Students without a B.S. degree in civil engineering will take remedial undergraduate courses to gain an appropriate background in civil engineering.

Admissions Requirements

To be admitted to the graduate Master of Science program in environmental engineering, the applicant must meet the Graduate School requirements (p. 25).

Financial Assistance

Research and/or teaching assistantships may be available. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference (and TOEFL results for international applicants) must be submitted to The Graduate School. Additional eligibility requirements for teaching assistantships can be found on the Graduate School website.

The Master of Science degree thesis is a scholarly document prepared by the student which is based on research performed. The research topic is chosen by the student in consultation with his or her adviser. The student and adviser together prepare a plan of study to meet the needs of the individual student. The program contains a minimum of 30 credits of graduate-level material, of which the thesis can count 6 to 10 credits. An overall GPA of 3.0 or better must be maintained. An oral defense of the research-based thesis and comprehensive academic subject matter is required.

A student entering the environmental engineering Master of Science degree program without an undergraduate engineering degree will be required to satisfy the undergraduate requirements for mathematics, basic science, and engineering sciences in addition to the Master of Science requirements.

Achintya N. Bezbaruah, Ph.D.
University of Nebraska-Lincoln, 2002
Research Interests: Environmental sensors, Recalcitrant and micro pollutants, Contaminant fate and transport, Small community water and wastewater treatment, Environmental management

Xuefeng (Michael) Chu, Ph.D.
University of California, Davis, 2002
Research Interests: Watershed Hydrologic and Environmental Modeling, Overland Flow and Infiltration, Integrated Modeling of Flow and Contaminant Transport

Wei Lin, Ph.D.
State University of New York at Buffalo, 1992
Research Interests: Water and Wastewater Treatment, Hazardous Waste Management

G. Padmanabhan, Ph.D. (Emeritus)
Purdue University, 1980
Research Interests: Stochastic Hydrology, Water Resource Systems, and Hydrologic Modeling

Eakalak Khan, Ph.D. (adjunct)
University of California, Los Angeles, 1997
Research Interests: Water and Wastewater Quality, Water and Wastewater Treatment, and Storm Water and Non-point Source Pollution

Robert Zimmerman, Ph.D. (adjunct)
North Dakota State University, 1991
Research Interests: Water and Wastewater Treatment, Solid Waste

Exercise Science and Nutrition

Department Information

- **Program Director:**
  Elizabeth Hilliard, Ph.D.
- **Department Location:**
  Bentson Bunker Fieldhouse
- **Department Phone:**
  (701)231-6737
- **Department Web Site:**
  www.ndsu.edu/hnes/phd_in_exercise_science_and_nutrition/ (http://www.ndsu.edu/hnes/phd_in_exercise_science_and_nutrition/)
- **Application Deadline:**
  Applications that are complete by March 15 will be given priority for fall semester. Applications completed after March 15 will be reviewed through May 1 for consideration for fall semester.
- **Credential Offered:**
  Ph.D.

- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5

Program Description

The Department of Health, Nutrition and Exercise Sciences (HNES) offers a Doctorate of Philosophy (PhD) program in Exercise Science and Nutrition (https://www.ndsu.edu/hnes/graduate_programs/phd_in_exercise_science_and_nutrition/). Exercise Science and Nutrition are traditionally separate disciplines that strive to improve human health or human performance. Combined, the two form a strong and natural approach to improve well-being. Exercise Science and Nutrition includes the study of energy systems, nutrient intake, behavior motivation, and the physiology and mechanics of movement. Faculty are scholars in community nutrition, nutrition across the lifespan, clinical nutrition, exercise science, biomechanics, and physical activity and health.

Program Objectives

The purpose of the PhD program is to train doctoral students in Exercise Science and Nutrition for future careers in industry and academia. The program requires coursework and scholarly activities that will produce professionals with strong skills in research, teaching, grant writing, and service who will be competitive and productive in their careers. These professionals will have a strong understanding of both Exercise Science and Nutrition that will enable them to assume positions of leadership in research and teaching in community, government, university or other professional agencies and organizations.

Professional Knowledge. Students understand disciplinary content knowledge and apply such knowledge in the field of exercise science and/or nutrition.

Scientific Inquiry and Research Skills. Students understand modes of scientific inquiry and develop research skills to answer questions in the disciplines of exercise and/or nutrition.

Professionalism. Students gain leadership experiences and obtain career-oriented credential(s) in exercise science and/or nutrition.

Career Opportunities

A PhD in Exercise Science and Nutrition offers a wide array of career opportunities. Graduates of the program can expect to work for governmental and human service agencies, for-profit and not-for-profit research organizations, as well as in university-level education and research positions. A unique and attractive aspect to this degree is that it can prepare students to work in either nutrition or exercise science academic units upon graduation. Graduates of this program are equipped to meet the needs of changing regional, national, and global populations as related to their health and well-being.

Admission Requirements

Of the qualified PhD applicants we receive, we expect to admit up to five students per year, based on the capacity of our current faculty. In addition to the core faculty members in HNES who will advise students and participate in this program, there are faculty inside and outside of the department whose research interests mesh well with the program.

Applicants with a Master's degree:

- Completion of a Master's degree from an accredited university in a field closely related to Nutrition, Health, Dietetics, Kinesiology, or Exercise Science.
- Cumulative graduate GPA of 3.00 or higher.
- GRE exam scores in the upper 50th percentile for the Verbal, Quantitative, and Writing portions are given priority admission.
- At least one graduate course in statistics and one course in research methods, with grades of B or higher in each.
- A completed thesis or research paper.
- Agreement to be advised by current HNES graduate faculty member.

Applicants without an earned Master's degree:

- Completion of a Bachelor's degree from an accredited university in a field closely related to Nutrition, Health, Dietetics, Kinesiology, or Exercise Science.
- Cumulative undergraduate GPA of 3.0 or higher.
- GRE exam scores in the upper 50th percentile for the Verbal, Quantitative, and Writing portions are given priority admission.
- At least one statistics course or research methods course with grades of B or higher.
- Agreement to be advised by current HNES graduate faculty member.

Financial Assistance

Graduate Assistantships are available for up to 20 hours a week based on faculty need and available funding. Assistantships are renewable on a yearly basis dependent upon student performance. Assistantship awards also include full tuition remission regardless of residency. Students are typically provided shared offices, computers, and access to printers, and support staff. Assistantships typically begin the week before fall semester classes and continue through finals week of spring semester. Summer is not included in most assistantship awards.

Students Entering with a Master's Degree

Code	Title	Credits
Research Core		**12**
STAT 725	Applied Statistics	
9 additional credits in statistics and research methodology		
Recommended HNES Core		**9**
HNES 713	Graduate Exercise Physiology	
HNES 726	Nutrition in Wellness	
HNES 777	Scholarly Writing and Presenting in HNES	
Electives (up to 6 credits outside of HNES)		**18**
HNES 727	Physical Activity Epidemiology	
HNES 703	Graduate Biomechanics of Sport and Exercise	
HNES 704	Psychological Foundation of Sport & Physical Activity	
HNES 710	Introduction to Research Design and Methods in HNES	
HNES 735	Nutrition and Human Performance	
HNES 743	Obesity Across the Lifespan	
HNES 754	Assessment in Nutrition and Exercise Science	
HNES 760	Skeletal Muscle Physiology	
HNES 761	Physiological and Fitness Assessment in Exercise Science	
HNES 762	Exercise Endocrinology	
HNES 764	Advanced Cardiovascular Exercise Physiology	
HNES 790	Graduate Seminar	
HNES 791	Temporary/Trial Topics	
Research Practicum (minimum of 3 credits)		**3-6**
HNES 894	Practicum/Internship	
Teaching Experience (minimum of 3 credits)		**3-6**
HNES 892	Graduate Teaching Experience	
Dissertation (must encompass at least two seperate semesters)		**15**
HNES 899	Doctoral Dissertation	
Total Credits (minimum)		**60**

Students Entering with a Bachelor's Degree

Code	Title	Credits
Research Core		**21**
STAT 725	Applied Statistics	
HNES 710	Introduction to Research Design and Methods in HNES	
12 additional credits in statistics and research methodology		
Recommended HNES Core		**9**
HNES 713	Graduate Exercise Physiology	
HNES 726	Nutrition in Wellness	
HNES 777	Scholarly Writing and Presenting in HNES	
Electives (up to 6 credits outside of HNES)		**33**
HNES 727	Physical Activity Epidemiology	
HNES 735	Nutrition and Human Performance	
HNES 703	Graduate Biomechanics of Sport and Exercise	

HNES 704	Psychological Foundation of Sport & Physical Activity	
HNES 743	Obesity Across the Lifespan	
HNES 754	Assessment in Nutrition and Exercise Science	
HNES 760	Skeletal Muscle Physiology	
HNES 761	Physiological and Fitness Assessment in Exercise Science	
HNES 762	Exercise Endocrinology	
HNES 764	Advanced Cardiovascular Exercise Physiology	
HNES 790	Graduate Seminar	
HNES 791	Temporary/Trial Topics	
Research Practicum (9-12 credits)		**9-12**
HNES 894	Practicum/Internship	
Teaching Experience (3-6 credits)		**3-6**
HNES 892	Graduate Teaching Experience	
Dissertation (must encompass at least two semesters)		**15**
HNES 899	Doctoral Dissertation	
Total Credits (minimum)		**90**

Bryan Christensen, Ph.D.
University of Kansas, 2000
Research Interests: Biomechanics, Sports Psychology, Strength and Conditioning

Shannon David, Ph.D.
Ohio University, 2013
Research Interests: Patient-Clinician Relationship, Patient Oriented Outcomes

Nathan Dicks, Ph.D.
North Dakota State University, 2019
Research Interests: Exercise Testing; Tactical Population Wellness, Fitness, and Performance

Marty Douglas, Ph.D.
Michigan State University, 2009
Research Interests: Adapted Physical Activity

Julie Garden-Robinson, Ph.D.
North Dakota State University, 1994
Research Interests: Nutrition Education, Chronic Disease Prevention, Food Safety/Science

Kyle Hackney, Ph.D,
Syracuse University, 2013
Research Interests: Skeletal Muscle, Sarcopenia, Muscle Inactivity, Ergogenic Aids, Sports Performance

Elizabeth Hilliard, Ph.D.
North Dakota State University, 2018
Research Interests: Breastfeeding Support and Promotion in the Workplace, and Infant and Child Feeding Practices

Ryan McGrath, Ph.D.
University of Idaho, 2015
Research Interests: Frailty and Health, Epidemiology of Aging, Physical Activity and Health for Aging Adults and Persons with Disabilities, Disability Prevention

Yeong Rhee, Ph.D.
Oklahoma State University, 1999
Research Interests: Chronic Disease Prevention, Functional Foods

Sherri Nordstrom Stastny, Ph.D.
North Dakota State University, 2007
Research Interests: Nutrition for Healthy Aging

Bradford N. Strand, Ph.D.
University of New Mexico, 1988
Research Interests: Physical Education Curriculum and Instruction, Fitness Education, Sport Sociology

Seungmin Kang, Ph.D.
Louisiana State University, 2021
Research Interests: Sport for Development and Peace (SDP), Shared Leadership in SDP, Nonprofit Partnerships, Leadership and Human Resource Development

Kelsey Slater, Ph.D.
Mississippi State University, 2021
Research Interests: Sport for Development, Sport Diplomacy and Sport Communication

Joel White, Ph.D
University of Northern Colorado, 2009
Research Interests: Sport Marketing and Sport Finance

Matt Drescher, Ph.D
Indiana State University, 2023
Research Interest: Curricular Design, Healthcare Simulation, Ethics Education, and Advanced Manual Therapy

Joshua Wooldridge, Ph.D
University of Nevada, Las Vegas, 2023
Research Interest: Musculoskeletal Injury Help-Seeking Behaviors, Health Sciences Research Methods, Tactical Health and Human Performance

Extension Education

Department Information

- **Department Chair:**
  Leigh Ann Skurupey, Ph.D.
- **Program Coordinator:**
  Adam Marx, Ph.D.
- **Department Location:**
  EML 155C
- **Application Deadline:**
  Applications will be accepted up to 3 weeks prior to the start of a new semester. Contact department with questions.
- **Credential Offered:**
  M.Ed., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

The master's degree in Extension Education prepares you with skills and knowledge to develop impactful, science-based educational programs and deliver educational resources in your role as an Extension professional. You will help the public identify and address local issues and concerns related to agriculture, leadership, community, family, and youth development.

You will:

- Explore the principles that guide Extension work.
- Develop programs and community outreach opportunities.
- Customize instructional methods for diverse audiences.
- Develop evaluation strategies for Extension programming.
- Gather, analyze, and communicate community-based research to various audiences.

What Is Extension Education

Extension Education focuses on "extending" university knowledge and resources to communities. Extension offices serve as a community-based education hub where Extension professionals learn about their local community needs and help develop educational programs to address them. Common initiatives are:

- Agriculture and Natural Resource Management
- Horticulture
- Youth Development
- Family Consumer Sciences
- Nutrition

- Volunteer Development
- Rural Community Development and Economics

Graduate study in Extension Education leads to the Master of Science (M.S.) or Master of Education (M.Ed.) degrees.

Admission Requirements

In addition to the Graduate School's required application materials, the program requires:

1) a statement of purpose that addresses the question, "How will this degree help me achieve my professional goals?"

2) a letter from a faculty member/specialist expressing their willingness and ability to mentor the candidate in their area of interest.

Admission is only considered after all required application materials have been received and reviewed.

This program requires completion of a minimum of 31 credits.

Code	Title	Credits
Core Courses		**12**
H&CE 645	Designing and Delivering Nonformal Education Programs	3
H&CE 724	Program Planning in School-Based and Extension Programs	3
H&CE 756	Program Development and Evaluation	3
H&CE 774	Teaching Family and Consumer Science with Technology	3
Research Methods		**3-6**
EDUC 750	Reflective Practice and Research in Education	3
EDUC 702	Statistics In Educational Research	3
Electives		**6**
EDUC 883	Survey Research	3
EDUC 851	Adult Learning	3
H&CE 667	Leading Youth Organizations	3
H&CE 743	Experiential and Learner-Centered Instruction	3
H&CE 746	International Extension	3
H&CE 646	Extension Education	3
HDFS 711	Youth Development	3
Other H&CE 600-700 level courses as approved by advisor		
Capstone		**3-6**
H&CE 798	Master's Thesis (M.S. degree students)	
H&CE 794	Practicum/Internship (Action Research/Creative Project - M.Ed. degree students)	
Total Credits		**30**

Extension Education Certificate

Choose a minimum of 9 credits from the following courses.

Code	Title	Credits
H&CE 645	Designing and Delivering Nonformal Education Programs	3
H&CE 646	Extension Education	3
H&CE 724	Program Planning in School-Based and Extension Programs	3
H&CE 743	Experiential and Learner-Centered Instruction	3
H&CE 746	International Extension	3
H&CE 756	Program Development and Evaluation	3
H&CE 774	Teaching Family and Consumer Science with Technology	3

Adam A. Marx, Ph.D.
University of Missouri, 2014
Research Interests: Adolescent Career Decision-Making, Student Engagement, Teacher Development

David Ripplinger, Ph.D.
North Dakota State University, 2011

Research Interests: Production Economics and Marketing

Meagan Hoffman, Ph.D.
Oklahoma State University, 2016
Research Interests: Positive Youth Development, Youth Wellness

Rachelle Vettern, Ph.D. (https://www.ndsu.edu/agriculture/ag-home/directory/rachelle-vettern/)
North Dakota State University
Research Interests: Volunteer Development, Leadership Development, Youth/Adolescent Development

Brooke Thiel, Ph.D.
North Dakota State University, 2020
Research Interests: Career Readiness, 21st Century Skills, Teacher Development

Family and Consumer Science Education

Department Information

- **Department Chair:**
  Leigh Ann Skurupey, Ph.D.
- **Program Coordinator:**
  Adam Marx, Ph.D.
- **Email:**
  adam.marx@ndsu.edu
- **Department Location:**
  EML 155C
- **Department Phone:**
  (701) 231-7921
- **Application Deadline:**
  Applications will be accepted up to 3 weeks prior to the start of a new semester. Contact department with questions.
- **Credential Offered:**
  M.S., M.Ed.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

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 (FCSE). Advanced work may be taken in FCSE, Career and Technical Education, Extension, and curriculum design and development.

Option A

This program is designed for a person who already has a bachelor's degree in a Family and Consumer Sciences related area and would like to work toward obtaining a teaching license. Upon completion, the program provides the pedagogy requirements that may lead to a Family and Consumer Sciences teaching certificate. Depending on the individual's bachelor's degree, there will most likely be several content courses that will need to be taken as well to meet licensing requirements. Licensing also involves state mandated tests. Student teaching is included in this program. This program is offered through the Interactive Distance Education Alliance. All courses in this master's degree are offered online and are taught by faculty at several different universities. For more information, please see: https://www.idea.edu/program/family-consumer-sciences-education (https://www.idea.edu/program/family-consumer-sciences-education/).

NOTE: Earning an academic/professional degree does not necessarily lead to state credential or licensure. Candidates seeking licensure may need to meet additional requirements such as tests and additional coursework. Potential and current students should consult with the appropriate academic program coordinator for advice about licensure, certification, or credentialing after communicating with the appropriate state official.

Option B

This program is designed to provide persons who currently hold a teaching degree in Family and Consumer Sciences with an expanded background in Family and Consumer Sciences Education and related content areas. It also examines the broader field of education, with a solid foundation in research methodology. Students are encouraged to complete additional course work in areas of interest. Internships can be incorporated into the program of study and provide an opportunity for students to examine current issues. Candidates should work closely with an adviser.

Qualified students may apply for admission to graduate programs in the School of Education leading to Master of Education (M.Ed.) or Master of Science (M.S.) degrees.

Those applying to Option A, in addition to the Graduate School's required application materials, need to hold a bachelor's degree in a FCS-related area and pass the Praxis Core Academic Skills exam, meeting ND cut scores in reading, writing and math. See http://www.ets.org/ for additional information and to register for the exam. They will also need to compose a 400-500 word original essay that answers the following questions: What are your reasons for applying to the Teacher Licensure program? How do your 20 hours working with youth supports your decision to apply to the Teacher Licensure program? The applicant must have at least a 3.0 undergraduate GPA, submit all transcripts, and submit letters of recommendation.

For those applying to Option B, in addition to the Graduate School's required application materials, the program requires submission of a statement of career goals consistent with the five propositions of the National Board of Professional Teaching Standards (NBPTS), http://www.nbpts.org/ as well as reasons for applying to the program. The School of Education reserves the right to obtain additional information about the student's professional competence from qualified professionals. The applicant must have at least a 3.0 undergraduate GPA, submit all transcripts, and submit letters of recommendation.

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met.

Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission.

Financial Assistance

Graduate assistantships are available in the School of Education. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. Students must be accepted into the Graduate School before they are eligible for an assistantship.

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 Education - for teacher licensure

Code	Title	Credits
Education Courses		**12**
EDUC 651P	Instructional Planning, Methods and Assessment	
EDUC 686	Classroom Management for Diverse Learners	
EDUC 689	Teaching Students of Diverse Backgrounds	
EDUC 724	Advanced Educational Psychology	
Content Area and Electives		**9**
H&CE 667	Leading Youth Organizations	
H&CE 668	Foundations of Family and Consumer Sciences Education	
H&CE 682	Methods of Teaching Family and Consumer Sciences	
H&CE 232 Philosophy and Policy of CTE (licensure requirement, not M.Ed. degree eligible)		
Practicum		**9**
H&CE 683P	Student Teaching Seminar	
H&CE 687P	Student Teaching	
H&CE 688P	Applied Student Teaching	
Total Credits		**30**

Master of Education - for teacher licensure (through IDEA (https://www.gpidea.org/program/family-consumer-sciences-education/))

Code	Title	Credits
Education Courses		**9**
EDUC 751	Students and Their Learning	
EDUC 755	Exceptional Learners in the Secondary School Classroom	
EDUC 775	Content Area Reading	
Major Concentration		**21**
H&CE 668	Foundations of Family and Consumer Sciences Education	
H&CE 682	Methods of Teaching Family and Consumer Sciences	
H&CE 740	Advanced CTE Philosophy and Policy	

H&CE 771	Human Relations for Educators	
H&CE 773	Occupational Programs in Family and Consumer Science	
H&CE 774	Teaching Family and Consumer Science with Technology	
H&CE 776	Research Design in Family and Consumer Sciences	
Field Experiences		**11**
H&CE 687P	Student Teaching	
H&CE 794	Practicum/Internship (with H&CE 668 & H&CE 682P)	
Total Credits		**41**

Master of Science or Master of Education - for licensed teachers

Code	Title	Credits
Core Courses		**15**
EDUC 702	Statistics In Educational Research	3
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		**15-18**
Choose from the following:		
EDUC 775	Content Area Reading	
H&CE 667	Leading Youth Organizations	
H&CE 724	Program Planning in School-Based and Extension Programs (non -GPIDEA only)	
H&CE 740	Advanced CTE Philosophy and Policy	
H&CE 772	Curriculum Development in Family and Consumer Sciences	
H&CE 773	Occupational Programs in Family and Consumer Science (through GPIDEA only)	
H&CE 774	Teaching Family and Consumer Science with Technology	
H&CE 776	Research Design in Family and Consumer Sciences (through GPIDEA only)	
H&CE 777	Evaluation in Family and Consumer Sciences (through GPIDEA only)	
H&CE 778	Administration of Family and Consumer Sciences Programs (through GPIDEA only)	
H&CE 779	Techniques of Supervision in Family and Consumer Sciences (through GPIDEA only)	
H&CE 787	Issues In Education	
H&CE 790	Graduate Seminar	
H&CE 795	Field Experience	
Culminating Experience		**3-10**
H&CE 794	Practicum/Internship (Action Research)	
or H&CE 798	Master's Thesis	
Total Credits		36

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

Family Financial Planning

Department Information

- **Department Head:**
  Joel Hektner, Ph.D.
- **Department Location:**
  Evelyn Morrow Lebedeff Hall
- **Department Phone:**
  (701) 231-8268
- **Department Web Site:**

www.ndsu.edu/hdfs/academics/masters_degree/ (http://www.ndsu.edu/hdfs/academics/masters_degree/)

- **Credential Offered:**
  Graduate Certificate

The need for personal and family financial planning is greater than ever. The 18 credit-hour graduate certificate program in *Financial Planning* is designed for students who want graduate coursework that meets the educational requirement to take the CFP® Certification Examination but who do not need a Master's degree. The 18 credit-hour graduate certificate program in *Financial Counseling* is designed for students who want graduate coursework that meets the educational requirement to take the AFC® Certification Examination but who do not need a Master's degree.

Curriculum

Select one of the options: Financial Planning or Financial Counseling

Code	Title	Credits
Financial Planning Option		
HDFS 762	Retirement Planning, Employee Benefits and the Family	3
HDFS 763	Personal Income Taxation	3
HDFS 765	Insurance Planning for Families	3
HDFS 766	Estate Planning for Families	3
HDFS 769	Financial Planning Case Studies	3
HDFS 771	Investing for the Family's Future	3
Total Credits		**18**

Code	Title	Credits
Financial Counseling Option		
HDFS 677	Financial Counseling	3
HDFS 740	Theories & Research in Family Financial Planning I	3
HDFS 768	Housing/Real Estate	3
HDFS 770	Fundamentals of Financial Planning	3
Select 6 credits of the following:		6
HDFS 741	Theories & Research in Family Financial Planning II	
HDFS 762	Retirement Planning, Employee Benefits and the Family	
HDFS 763	Personal Income Taxation	
HDFS 765	Insurance Planning for Families	
HDFS 766	Estate Planning for Families	
HDFS 771	Investing for the Family's Future	
HDFS 772	Military Personal Financial Readiness	
HDFS 794	Practicum/Internship	
Total Credits		**18**

Genomics, Phenomics, and Bioinformatics

Department Information

- **Program Director:**
  Changhui Yan, Ph.D.
- **Email:**
  Changhui.Yan@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/gpb/ (http://www.ndsu.edu/gpb/)
- **Application Deadline:**
  International applications are due May 1 for fall semester and October 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Credential Offered:**
  Ph.D., M.S.

- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

The Genomics, Phenomics, and Bioinformatics (GPB) program is an interdisciplinary graduate program that spans multiple colleges at North Dakota State University (NDSU). The program offers Ph.D. and M.S. degrees in three program areas: functional genomics, phenomics, and bioinformatics.

The program is designed to provide students the necessary skills and intellectual background to work cooperatively with others in a research area that take a systems-wide approach to the study of the organization of life and expression and regulation of genes in an organism. Students in the program will perform advanced study, training and research in areas that focus on functional genomics, high-throughput phenotyping, and computation analysis of genomic and phenomics data. Students will learn and master the multi-omics approaches for research in many frontiers. Exposure to modern techniques, instrumentation, computational and statistical methods will prepare the student for success in both industrial and academic careers.

Faculty in the program have broad research focuses including plant and human growth and development, reproduction, defense against abiotic and biotic stresses, and computational and statistical methods.

Visit the program website to find more information about the program, including faculty members and their research: www.ndsu.edu/gpb/faculty_and_research/ (https://www.ndsu.edu/gpb/faculty_and_research/).

It is the intent of the program to admit students into one of three tracks. The Functional Genomics track will be for students interested in the generation and application of genomic information. The Bioinformatics track is intended for students interested in using computational and statistical approaches to analyze large amounts of genomic data. The Phenomics track will be attractive to students interested in the application of high-throughput equipment to measure important traits necessary for full expression of the traits necessary for the organism to productively complete its life cycle.

The program is open to qualified graduates of universities of recognized standing. The Graduate School minimum for the TOEFL examination applies. In addition, the following are the requirements to be admitted with full standing.

Functional Genomics track: a Bachelor of Science (B.S.) degree with an introductory biology class emphasizing molecular biology; with courses in genetics, physiology, biochemistry; an upper-division statistics class. A minimum undergraduate GPA of 3.0.

Bioinformatics and Phenomics tracks: a B.S. degree with an introductory biology class emphasizing molecular biology; with courses in calculus, upper-division statistics class, calculus or matrix algebra, and programming language experience. A minimum undergraduate GPA of 3.0.

Students can be accepted conditionally into any track without meeting the course or GPA requirements, but will be required to meet those requirements while in residency.

Adviser and Supervisory Committee

During the first year, the student will form a supervisory committee and submit the Plan of Study to the Graduate School. The committee must include the student's major adviser, at least one other faculty member of the Genomics, Phenomics, and Bioinformatics program, and a third member from outside the student's home college. For Ph.D. students only, a fourth member of the committee serves as the Graduate School Representative (GSR). Requirements for GSR can be found here (https://catalog.ndsu.edu/graduate/graduate-school-policies/doctoral-degree-policies/#planofstudysupervisorycommitteetext).

Master's Requirements

Code	Title	Credits
Functional Genomics - Thesis Option		
Core Courses		
PLSC 611	Genomics	3
CSCI/MATH/STAT 732	Introduction To Bioinformatics	3
PLSC 721	Genomics Techniques (BIOC 674 is 3 credits)	2
or BIOC 674	Methods of Recombinant DNA Technology	
796 Current Topics in Genomics (1 credit, 2 semesters)		2
790 Graduate Seminar		1
Electives: At least one course from two elective areas		9
798 Master's Thesis (6-10)		
Total Credits		30

Code	Title	Credits
Functional Genomics Comprehensive Study Option		
PLSC 611	Genomics	3
CSCI 732	Introduction To Bioinformatics	3
PLSC 721	Genomics Techniques (or)	2
BIOC 674	Methods of Recombinant DNA Technology	3
796 Current Topics (1 credit, 2 semesters)		2
790 Graduate Seminar		1
Electives: At least one course from two elective areas		
797 Master's Paper		4
Total Credits		**30**

Code	Title	Credits
Bioinformatics - Thesis Option		
PLSC 611	Genomics	3
CSCI 732	Introduction To Bioinformatics	3
CSCI 859	Computational Methods in Bioinformatics	3
796 Current Topics (1 credit, two semesters)		2
790 Graduate Seminar		1
Electives: At least one course from two elective areas		9
798 Master's Thesis		6-10
Total Credits		**30**

Code	Title	Credits
Bioinformatics Comprehensive Study Option		
PLSC 611	Genomics	3
CSCI 732	Introduction To Bioinformatics	3
CSCI 859	Computational Methods in Bioinformatics	3
796 Current Topics (1 credit, 2 semesters)		2
790 Graduate Seminar		1
Electives: At least one course from two elective areas		15
797 Master's Paper		4
Total Credits		**30**

Code	Title	Credits
Phenomics Thesis Option		
CSCI 679	Introduction to Data Mining	3
ABEN 747	Numerical Modeling of Environmental and Biological Systems	3
Physiology Elective		3
796 Special Topics (1 credit, 2 semesters)		2
790 Graduate Seminar		1
Electives: At least one course from two elective areas		9
798 Master's Thesis		6-10
Total Credits		**30**

Code	Title	Credits
Physiology Electives		
ANSC 663	Physiology of Reproduction	3
BIOL 660	Animal Physiology	3
BIOL 662	Physiological Ecology	3

BIOL 664	Endocrinology	3
BIOL 683	Cellular Mechanisms of Disease	3
BIOL 825	Biology of Aging	3
BIOL 861	Advanced Physiology - Physiology of Extremes	3
MICR 650		3
MICR 680	Microbial Physiology	3
PPTH 751	Physiology Of Plant Disease	3
PLSC 686	Applied Crop Physiology	3
PLSC 750	Crop Stress Physiology	3
PSCI 747	Cardiovascular Pharmacology	3
PSCI 762	Advanced Biopharmaceutics	2
PSCI 765	Cancer Cell Biology	2
Gene Expression		
BIOC 660	Foundations of Biochemistry and Molecular Biology I	3
BIOC 683	Cellular Signal Transduction Processes and Metabolic Regulation	3
BIOC 719	Molecular Biology of Gene Expression and Regulation	3
BIOC 723	Structural Basis of Membrane Transport and Signaling	3
BIOL 682	Developmental Biology	3
BIOL 820	Advanced Cell Biology	3
MICR 775		3
PLSC 731	Plant Molecular Genetics	3
Genetics and Genomics Electives		
ANSC 657		3
ANSC 750		1
ANSC 751		1
ANSC 752		1
BIOL 679	Biomedical Genetics and Genomics	3
BIOL 859	Evolution	3
BIOL 860	Evolutionary Ecology	3
BIOL 862	Environment and Adaptation	3
MICR 681	Microbial Genomics with Computational Laboratory	3
MICR 682	Microbial Genetics	3
MICR 783	Advanced Bacterial Genetics and Phage	3
PLSC 631	Intermediate Genetics (required for Functional Genomics Option)	3
PLSC 741		4
PLSC 751	Advanced Plant Genetics	3
PLSC 782	Population and Quantitative Genetics	4
PPTH 755	Population Biology of Plant Pathogens	3
PPTH 759	Host-Parasite Genetics	3
PSCI 617	Pharmacogenomics	2
Computer Science, Statistics, and Computational Biology Electives		
ANSC 850	Linear Models in Animal Breeding	1
ANSC 851	Genetic Prediction	1
ANSC 852	Applied Variance Component Estimation	1
ANSC 856		1
BIOL 842	Quantitative Biology	3
BIOL 877	Analysis of Population and Demographic Data	3
CSCI 679	Introduction to Data Mining	3
CSCI 724	Survey of Artificial Intelligence	3
CSCI 736	Computational Intelligence	3
CSCI 765	Introduction to Database Systems	3
CSCI 879		3

MATH 630	Graph Theory	3
MATH 636	Combinatorics	3
MATH 684	Mathematical Methods of Biological Processes	3
MATH 830	Graph Theory	3
MATH 839	Topics in Combinatorics and Discrete Mathematics	3
MATH 867	Topics in Applied Mathematics	3
MICR 724		3
PLSC 749	Applied Plant Molecular Breeding	3
PH 674	Epidemiology	3
PH 706	Essentials of Epidemiology	3
PH 731	Biostatistics	3
PH 750	Epidemiologic Methods I	2
PH 752	Epidemiologic Methods II	2
PLSC 724	Field Design I	3
STAT 650	Stochastic Processes	3
STAT 661	Applied Regression Models (required for Bioinformatics Ph.D. option)	3
STAT 711	Basic Computational Statistics using R	3
STAT 712	Applied Statistical Machine Learning	3
STAT 713	Introduction to Data Science	3
STAT 714	Statistical Big Data Visualization	3
STAT 725	Applied Statistics	3
STAT 764	Multivariate Methods	3
STAT 840	Introduction to Statistical Design and Analysis of Gene Expression Experiments	3
STAT 851	Bayesian Statistical Inference	3
STAT 860	Statistical Machine Learning	3
Modeling and Sensing Electives		
ABEN 747	Numerical Modeling of Environmental and Biological Systems	3
ABEN 758	Applied Computer Imaging and Sensing for Biosystems	3
CE 725	Biomaterials-Materials in Biomedical Engineering	3
CSCI 628	Artificial Intelligence, Ethics, and the Environment	3
GEOG 655	Introduction to Geographic Information Systems	4
GEOG 656	Advanced Geographic Information Systems	3
GEOG 670	Remote Sensing	3
GEOG 680	Geographic Information Systems Pattern Analysis and Modeling	3
PAG 654	Applications of Precision Agriculture	3

Doctoral Requirements

Code	Title	Credits
Functional Genomics		
PLSC 611	Genomics	3
CSCI 732	Introduction To Bioinformatics	3
PLSC 721	Genomics Techniques (or)	2
or BIOC 674	Methods of Recombinant DNA Technology	
796 Current Topics (1 credit, 3 semesters)		3
790 Graduate Seminar (1 credit, 2 semesters)		2
Requested Core Courses (unless in M.S. transcript)		
PLSC 631	Intermediate Genetics	3
STAT 726	Applied Regression and Analysis of Variance	3
Graduate Evolution Course		
Electives: At least one course from three elective areas		15

899 Doctoral Dissertation	up to 90

Code	Title	Credits
Bioinformatics Option		
PLSC 611	Genomics	3
CSCI 732	Introduction To Bioinformatics	3
CSCI 859	Computational Methods in Bioinformatics	3
796 Current Topics (1 credit, 3 semesters)		3
790 Graduate Seminar (1 credit, 2 semesters)		2
Required Core Courses (unless in M.S. transcript)		
CSCI 679	Introduction to Data Mining	3
CSCI 765	Introduction to Database Systems	3
STAT 661	Applied Regression Models	3
Electives: At least one course from three elective areas		15
899 Doctoral Dissertation		up to 90

Code	Title	Credits
Phenomics Option		
CSCI 679	Introduction to Data Mining	3
ABEN 747	Numerical Modeling of Environmental and Biological Systems	3
Physiology Course		3
796 Current Topics (1 credit, 3 semesters)		3
790 Graduate Seminar (1 credit, 2 semesters)		2
STAT 726	Applied Regression and Analysis of Variance	3
CSCI 765	Introduction to Database Systems	3
Electives: At least one course from three elective areas		15
899 Doctoral Dissertation		up to 90

Code	Title	Credits
Physiology Electives		
ANSC 663	Physiology of Reproduction	3
BIOL 662	Physiological Ecology	3
BIOL 664	Endocrinology	3
BIOL 683	Cellular Mechanisms of Disease	3
BIOL 825	Biology of Aging	3
MICR 650		3
MICR 680	Microbial Physiology	3
MICR 785		3
PPTH 751	Physiology Of Plant Disease	3
PLSC 686	Applied Crop Physiology	3
PLSC 750	Crop Stress Physiology	3
PSCI 747	Cardiovascular Pharmacology	3
PSCI 762	Advanced Biopharmaceutics	2
PSCI 765	Cancer Cell Biology	2
Gene Expression Electives		
BIOC 660	Foundations of Biochemistry and Molecular Biology I	3
BIOC 683	Cellular Signal Transduction Processes and Metabolic Regulation	3
BIOC 719	Molecular Biology of Gene Expression and Regulation	3

BIOC 723	Structural Basis of Membrane Transport and Signaling	3
BIOL 682	Developmental Biology	3
BIOL 820	Advanced Cell Biology	3
MICR 775		3
PLSC 731	Plant Molecular Genetics	3
Genetics and Genomics Electives		
ANSC 657		3
ANSC 750		1
ANSC 751		1
ANSC 752		1
BIOL 679	Biomedical Genetics and Genomics	3
BIOL 859	Evolution	3
BIOL 860	Evolutionary Ecology	3
BIOL 862	Environment and Adaptation	3
MICR 681	Microbial Genomics with Computational Laboratory	3
MICR 682	Microbial Genetics	3
PPTH 755	Population Biology of Plant Pathogens	3
PPTH 759	Host-Parasite Genetics	3
PLSC 631	Intermediate Genetics	3
PLSC 741		3
PLSC 751	Advanced Plant Genetics	3
PLSC 782	Population and Quantitative Genetics	4
PSCI 617	Pharmacogenomics	2
Computer Science, Statistics, and Computational Biology Electives		
ANSC 850	Linear Models in Animal Breeding	1
ANSC 851	Genetic Prediction	1
ANSC 852	Applied Variance Component Estimation	1
ANSC 856		1
BIOL 842	Quantitative Biology	3
BIOL 877	Analysis of Population and Demographic Data	3
CSCI 679	Introduction to Data Mining	3
CSCI 724	Survey of Artificial Intelligence	3
CSCI 736	Computational Intelligence	3
CSCI 765	Introduction to Database Systems	3
CSCI 879		3
MATH 630	Graph Theory	3
MATH 636	Combinatorics	3
MATH 830	Graph Theory	3
MATH 839	Topics in Combinatorics and Discrete Mathematics	3
MATH 864	Calculus Of Variations	3
MATH 867	Topics in Applied Mathematics	3
MICR 724		3
PLSC 749	Applied Plant Molecular Breeding	3
PH 674	Epidemiology	3
PH 706	Essentials of Epidemiology	3
PH 731	Biostatistics	3
PH 750	Epidemiologic Methods I	2
PH 752	Epidemiologic Methods II	2
PLSC 724	Field Design I	3
STAT 650	Stochastic Processes	3
STAT 661	Applied Regression Models	3
STAT 711	Basic Computational Statistics using R	3

STAT 712	Applied Statistical Machine Learning	3
STAT 713	Introduction to Data Science	3
STAT 714	Statistical Big Data Visualization	3
STAT 725	Applied Statistics	3
STAT 726	Applied Regression and Analysis of Variance	3
STAT 764	Multivariate Methods	3
STAT 840	Introduction to Statistical Design and Analysis of Gene Expression Experiments	3
STAT 851	Bayesian Statistical Inference	3
STAT 860	Statistical Machine Learning	3
Modeling and Sensing Electives		
ABEN 747	Numerical Modeling of Environmental and Biological Systems	3
ABEN 758	Applied Computer Imaging and Sensing for Biosystems	3
CE 725	Biomaterials-Materials in Biomedical Engineering	3
CSCI 628	Artificial Intelligence, Ethics, and the Environment	3
GEOG 655	Introduction to Geographic Information Systems	4
GEOG 656	Advanced Geographic Information Systems	3
GEOG 665	Remote Sensing of the Environment	3
GEOG 670	Remote Sensing	3
GEOG 680	Geographic Information Systems Pattern Analysis and Modeling	3
PAG 654	Applications of Precision Agriculture	3

Examinations

1. **Qualifying Exam (Ph.D. only):** This exam consists of written and oral portions. The student will complete a written exam that emphasizes the application of materials presented in the core courses. The members of the graduate program faculty will submit these questions. The oral exam will be administered by the student's supervisory committee and will focus on material beyond the core courses that are specific to the research of the student. Upon completion of the qualifying exam, the student will be accepted as a Ph.D. candidate.
2. **Final Exam:** The final exam will be an oral defense of the student's research results. The student's supervisory committee will administer the exam.

Gerontology

Department Information

- **Program Coordinator:**
  Susan Ray-Degges, Ph.D.
- **Department Phone:**
  (701) 231-7218
- **Application Deadline:**
  Based on first major requirements.
- **Credential Offered:**
  Ph.D. Dual Major
- **English Proficiency Requirements:**
  Based on first major requirements.

The Doctor of Philosophy (Ph.D.) dual-major option in Gerontology at North Dakota State University provides unique opportunities to study and conduct research in this growing and exciting field by linking a discipline based Plan of Study with an interdisciplinary perspective on aging. Depending on your specific area of interest, students will combine academic coursework in a primary major (Developmental Science, Exercise Science and Nutrition, Occupational and Adult Education, or Psychology) with a secondary dual-major in Gerontology. The mission of the option is to promote aging-related research and education at NDSU that uses a discipline based perspective that serves to enhance the length and quality of life.

Admission Requirements

Based on first major requirements.

In addition to meeting the requirements for the first major, the following Gerontology requirements must be completed.

Code	Title	Credits
ID 705	Interdisciplinary Perspectives in Environments for Aging	3
HDFS 723	Foundations in Integrative Aging Studies	3
or HDFS 725	Socioemotional and Cognitive Well-being throughout Adulthood	
HDFS 760	Aging Policy and Advocacy	3
EDUC 851	Adult Learning	3
or EDUC 853	Instructional Methods for Adult Learners	
PSYC 671	The Psychology Of Aging	3
or SOC 640	Sociology Of Aging	
or SOC 641	Death and Dying	

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.

Susan Ray-Degges, Ph.D., Program Coordinator
School of Design, Architecture and Art

Sherri Stastny, Ph.D.
Health, Nutrition and Exercise Science

Ryan McGrath, Ph.D.
Health, Nutrition and Exercise Science

Elizabeth Gilblom, Ph.D.
School of Education

Melissa O'Connor, Ph.D.
Human Development and Family Science

Heather Fuller, Ph.D.
Human Development and Family Science

Gerontology

Department Information

- **Department Location:**
  Evelyn Morrow Lebedeff Hall
- **Department Phone:**
  (701) 231-8268
- **Department Web Site:**
  www.ndsu.edu/hdfs/academics/masters_degree/ (http://www.ndsu.edu/hdfs/academics/masters_degree/)
- **Credential Offered:**
  Graduate Certificate

Gerontology is the multidisciplinary study of the aging processes and individuals as they grow from middle age through later life.Some gerontologists work directly with older persons in a wide variety of programs and services in the community. Others work on behalf of older persons in areas such as advocacy and teaching about aging.

Some use the certificate for continuing education credits or a career ladder opportunity. A graduate certificate can also be used to supplement a master's degree in another field.

Curriculum

Code	Title	Credits
Required Courses		
HDFS 721	Contemporary Perspectives on Adult Development and Aging	3

HDFS 723	Foundations in Integrative Aging Studies	3
Elective Courses- Select 2		6
HNES 652	Physical Health, Wellness, Nutrition and Active Aging	
ADHM 705		
HDFS 722	Applied Research Methods and Evaluation of Aging Programs	
HDFS 725	Socioemotional and Cognitive Well-being throughout Adulthood	
HDFS 726	Family Relationships and Aging	
HDFS 760	Aging Policy and Advocacy	
HDFS 761	Implementation of Community Programs for Older Adults	
HDFS 790	Graduate Seminar (*)	
Total Credits		**12**

GIS and Remote Sensing

Department Information

- **Department Location:**
  Stevens Hall
- **Department Phone:**
  (701) 231-8785
- **Department Web Site:**
  ndsu.edu/eegs/ (http://ndsu.edu/eegs/)
- **Credential Offered:**
  Graduate Certificate

The Geographic Information Systems (GIS) and Remote Sensing certificate program is a 13-credit program in geospatial techniques. The certificate provides an opportunity for students to acquire additional credentials in the field and is available to graduate students from any discipline. Use and applications of GIS and Remote Sensing continue to grow and be desirable skill sets in many careers. This certificate program will provide both the depth and breadth of skills necessary for utilizing geospatial data in diverse careers.

Certificate Requirements

Code	Title	Credits
Required Courses		**7**
GEOG 655	Introduction to Geographic Information Systems	
GEOG 670	Remote Sensing	
Choose two courses from the following:		**6**
GEOG 656	Advanced Geographic Information Systems	
GEOG 665	Remote Sensing of the Environment	
GEOG 680	Geographic Information Systems Pattern Analysis and Modeling	
Total Credits		**13**

Health, Nutrition and Exercise Science

Department Information

- **Department Head:**
  Yeong Rhee, Ph.D.
- **Graduate Coordinator:**
  Elizabeth Hilliard, Ph.D.
- **Department Location:**
  Bentson Bunker Fieldhouse
- **Department Phone:**
  (701) 231-7474
- **Department Web Site:**
  www.ndsu.edu/hnes/ (http://www.ndsu.edu/hnes/)
- **Application Deadline:**

Exercise/Nutrition Science option: Applications will be reviewed until August 1 for fall and December 1 for spring. Leadership in Physical Education and Sport option: rolling enrollment; enrollment is limited to 32 students

- **Credential Offered:**
  M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

The Master of Science (M.S.) in Health, Nutrition, and Exercise Sciences (HNES) prepares the graduate for advanced positions with an emphasis in the areas of physical activity, exercise science, nutrition, and health promotion. The department is devoted to researching and understanding the long-term effects of physical activity and nutrition, and translating this research into effective exercise science and wellness programs for children, adolescents, and adults of all ages. This option is appropriate for Nutrition, Dietetics, and Exercise Science graduates. There are three paths to complete the MS degree in this option (Plan A- Thesis, Plan B- Paper, Plan C- Internship/Capstone).

Accelerated BS/MS in Dietetics and Nutrition

This is a combined program for undergraduate dietetics students. Students apply for the dietetics program in the spring of their second (sophomore) year and then apply for the accelerated M.S. program in the fall of their third (junior) year. Students in this option will earn a B.S. in Dietetics, an M.S. in Exercise/Nutrition Science, and complete the required 1200 hours of supervised practice to sit for the national Registration Exam for Dietitians. The program is designed to be completed in 5 years. Students who are interested should contact the College of Human Development and Education Academic Advisor located in EML 270 for more information.

Admission to a MS- HNES program is considered ONLY after all required application materials have been received and reviewed. The department admits students for fall semester only.

Minimum criteria and application information to be considered for admission for all paths (Plan A- thesis, Plan B- paper, Plan C- Internship/Capstone):

Note-meeting the minimum criteria does not guarantee acceptance in the program. Workload limitations and capacity limits for the program or faculty mentor apply.

- The GRE is **NOT** required for this degree option.
- GPA 3.0 or higher
- Undergraduate major of Dietetics, Exercise Science, or closely related field.
- Application to the NDSU Graduate School which includes: precise statement of purpose, official transcripts, and two professional letters of recommendation.
- In the application, please indicate what degree path (Plan A- Thesis, Plan B- Paper, Plan C- Internship/Capstone) you are primarily considering at this time. This path can change once admitted but provides the HNES department with preliminary information on your plan of study. A description of all the paths are described below.
- Please also note in your application if you are interested in a graduate assistantship position and indicate any previous experience with teaching, research, or other specific skills, abilities, or certifications you possess that would be relevant.

The Department of Health, Nutrition, and Exercise Sciences reserves the right to obtain additional information about the applicant's professional competence from qualified professionals. Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data.

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.

Graduate assistants receive a financial stipend for their work. In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits. Assistantships are available contingent upon current funding and faculty need.

Exercise/Nutrition Science Option

Plan A- thesis

The thesis typically includes a problem statement, a review of existing literature relevant to that problem, and the creation and presentation of new knowledge in providing a solution to the problem. Each student assembles a supervisory committee and pass a final oral examination in which the supervisory committee serves as the examining committee. Following a successful defense, the candidate will submit an electronic copy of their thesis to the Graduate School for review. This path is recommended for all students but specifically relevant for those interested in going on to further graduate work (PhD, DPT, MD). Total Credits 30.

Plan B- paper

The Plan B master's student will develop a thorough understanding of existing knowledge and the ability to apply that existing knowledge to a problem of interest. Note that under this degree, the new knowledge being created is limited, and this is the primary difference between the Plan A and Plan B degrees. The precise nature of the individual creative component is defined by the program. Examples of possible creative components include a comprehensive paper or an integrated field experience. Each student would assemble a supervisory committee and pass a final oral examination. Following a successful defense, the candidate will compose an executive summary or assemble other appropriate documentation as defined by the program to be submitted to the Graduate School. This submission to the Graduate School is to be approved by the student's supervisory committee. This path is recommended for all students but is specifically relevant for those who wish to obtain employment directly after completing their degree or who may still be interested in further graduate work but the scope of the next step is not yet defined.Total credits 30.

Plan C-Internship/Capstone

The Plan C is designed for programs in which a well-defined culminating experience is more important than is an individual creative component. Each program will define a culminating experience such as a capstone experience or some other approach to measure the candidate's understanding of the relevant material in the area (certification, internship experience/project). Upon completion of the appropriate course work and culminating experience, the candidate must submit the examination documentation (if required by program) and an Application for Graduate Degree to Graduate School. This path is recommended for all students but is specifically relevant for those who are currently employed full-time in the community and are wishing to advance their current employment status (i.e., no further graduate work). Total credits 30.

Code	Title	Credits
Research Core Requirements		**6**
HNES 710	Introduction to Research Design and Methods in HNES	
STAT 725	Applied Statistics	
or HDFS 705	Quantitative Methods in Developmental Science	
Exercise Science Core Requirements		**6 (minimum)**
Choose six credits from this list:		
HNES 604	Adapted Physical Activity	3
HNES 703	Graduate Biomechanics of Sport and Exercise	3
HNES 704	Psychological Foundation of Sport & Physical Activity	3
HNES 713	Graduate Exercise Physiology	3
HNES 727	Physical Activity Epidemiology	3
HNES 743	Obesity Across the Lifespan	3
HNES 760	Skeletal Muscle Physiology	3
HNES 761	Physiological and Fitness Assessment in Exercise Science	3
HNES 762	Exercise Endocrinology	3
HNES 764	Advanced Cardiovascular Exercise Physiology	3
HNES 777	Scholarly Writing and Presenting in HNES	3
Nutrition Science Core Requirements		**6 (minimum)**
Choose six credits from this list:		
HNES 642	Community Health and Nutrition Education	3
HNES 658	Advanced Medical Nutrition Therapy	3-4
HNES 668	Foodservice Systems Management II	1
HNES 726	Nutrition in Wellness	3
HNES 735	Nutrition and Human Performance	3
HNES 750	Advanced Human Nutrition: Macronutrients	3
HNES 754	Assessment in Nutrition and Exercise Science	3
Note- the first 6 credits completed in exercise science core and nutrition science core above will meet minimum requirements. Additional courses after the first 6 credits in each category are used to fill elective courses that are also listed below.		
HNES Electives Requirement		**6-9**
Select two/three courses from below based on your degree option: Plan A- Thesis 6 credits, Plan B- Paper 9 credits, Plan C-9 credits		
HNES 604	Adapted Physical Activity	3
HNES 703	Graduate Biomechanics of Sport and Exercise	3
HNES 704	Psychological Foundation of Sport & Physical Activity	3
HNES 713	Graduate Exercise Physiology	3

HNES 727	Physical Activity Epidemiology	3
HNES 743	Obesity Across the Lifespan	3
HNES 760	Skeletal Muscle Physiology	3
HNES 761	Physiological and Fitness Assessment in Exercise Science	3
HNES 762	Exercise Endocrinology	3
HNES 764	Advanced Cardiovascular Exercise Physiology	3
HNES 777	Scholarly Writing and Presenting in HNES	3
HNES 642	Community Health and Nutrition Education	3
HNES 658	Advanced Medical Nutrition Therapy	3-4
HNES 668	Foodservice Systems Management II	1
HNES 726	Nutrition in Wellness	3
HNES 735	Nutrition and Human Performance	3
HNES 750	Advanced Human Nutrition: Macronutrients	3
HNES 754	Assessment in Nutrition and Exercise Science	3
HNES 791	Temporary/Trial Topics	3
Culminating Experience		**3-6**
Plan A - Master's Thesis		6
HNES 798	Master's Thesis	
Plan B - Master's Paper		3
HNES 797	Master's Paper	
Plan C. Internship/Capstone - Select from the following		3
HNES 793	Individual Study	
HNES 794	Practicum/Internship	
HNES 795	Field Experience	
Total credits		30

Bryan Christensen, Ph.D.
University of Kansas, 2000
Research Interests: Biomechanics, Sports Psychology, Strength and Conditioning

Shannon David, Ph.D.
Ohio University, 2013
Research Interests: Patient-Clinician Relationship, Patient Oriented Outcomes

Nathan Dicks, Ph.D.
North Dakota State University, 2019
Research Interests: Exercise Testing; Tactical Population Wellness, Fitness, and Performance

Marty Douglas, Ph.D.
Michigan State University, 2009
Research Interests: Adapted Physical Activity

Julie Garden-Robinson, Ph.D.
North Dakota State University, 1994
Research Interests: Nutrition Education, Chronic Disease Prevention, Food Safety/Science

Kyle Hackney, Ph.D,
Syracuse University, 2013
Research Interests: Skeletal Muscle, Sarcopenia, Muscle Inactivity, Ergogenic Aids, Sports Performance

Elizabeth Hilliard, Ph.D.
North Dakota State University, 2018
Research Interests**:** Breastfeeding Support and Promotion in the Workplace, and Infant and Child Feeding Practices

Ryan McGrath, Ph.D.
University of Idaho, 2015
Research Interests: Frailty and Health, Epidemiology of Aging, Physical Activity and Health for Aging Adults and Persons with Disabilities, Disability Prevention

Yeong Rhee, Ph.D.

Oklahoma State University, 1999
Research Interests: Chronic Disease Prevention, Functional Foods

Sherri Nordstrom Stastny, Ph.D.
North Dakota State University, 2007
Research Interests: Nutrition for Healthy Aging

Bradford N. Strand, Ph.D.
University of New Mexico, 1988
Research Interests: Physical Education Curriculum and Instruction, Fitness Education, Sport Sociology

Seungmin Kang, Ph.D.
Louisiana State University, 2021
Research Interests: Sport for Development and Peace (SDP), Shared Leadership in SDP, Nonprofit Partnerships, Leadership and Human Resource Development

Kelsey Slater, Ph.D.
Mississippi State University, 2021
Research Interests: Sport for Development, Sport Diplomacy and Sport Communication

Joel White, Ph.D
University of Northern Colorado, 2009
Research Interests: Sport Marketing and Sport Finance

Matt Drescher, Ph.D
Indiana State University, 2023
Research Interest: Curricular Design, Healthcare Simulation, Ethics Education, and Advanced Manual Therapy

Joshua Wooldridge, Ph.D
University of Nevada, Las Vegas, 2023
Research Interest: Musculoskeletal Injury Help-Seeking Behaviors, Health Sciences Research Methods, Tactical Health and Human Performance

History

Department Information

- **Department Head:**
  Dennis Cooley, Ph.D.
- **Graduate Program Director:**
  Marcela Perett, Ph.D.
- **Department Location:**
  422 Minard
- **Department Phone:**
  (701) 231-8654
- **Department Email:**
  ndsu.history@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/history/ (http://www.ndsu.edu/history/)
- **Application Deadline:**
  April 1 for assistantship consideration
- **Credential Offered:**
  Ph.D., M.A., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 100; IELTS 7; Duolingo 125

The graduate program in history at North Dakota State University has offered a master's degree since the Graduate School was founded in 1954 and a Ph.D. in History since 2002. For more information on our Master's and Doctoral programs, please see the department's website www.ndsu.edu/history/. (https://www.ndsu.edu/history/)

Admission 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, organize thoughts logically, and communicate clearly and effectively.

Ph.D.

Preference for admission into the Ph.D. program with full graduate standing will be given to applicants who have a GPA of at least 3.5 in history courses in an earned bachelor's or master's degree.

Applicants must submit a statement of purpose clearly outlining their research interests, potential major adviser, career goals, and purpose for seeking a Ph.D. in History. Applicants must also submit a substantial paper submitted for a class in History to provide evidence of ability to research thoroughly, interpret and analyze primary and secondary sources, synthesize information, organize thoughts logically, and communicate clearly and effectively.

Residency Requirements

Students enrolled in the Ph.D. program are required to complete at least one academic year (18 credits minimum) in residence on campus.

Most graduate courses are held during the workday, but several courses are offered in the late afternoon and evening each semester to accommodate working professionals within driving distance of NDSU. Online courses are not typically offered.

Financial Assistance

Both graduate teaching and research assistantships are available. Students wishing to apply for assistantships should indicate this in their application. The deadline for assistantship applications is March 1. Graduate assistants work between 10 and 20 hours per week. In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

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 toward completion of a degree, financial need, and minority status in cases of equally qualified candidates.

Master's students can expect a maximum of 2 years of funding, while doctoral students may have 4 years of support if the above expectations are met and funding is available.

Master's Degree

Master of Arts

The department offers both the Master of Arts (M.A.) and the Master of Science (M.S.) degrees in history. The Master of Arts requires proficiency in at least one foreign language and the successful defense of a thesis. Those planning to continue graduate study in history at the doctoral level are strongly encouraged to pursue the M.A. The Master of Science is designed for in-service professionals and has no language or thesis requirement; students pursuing the M.S. are generally not awarded assistantships or tuition waivers. Both degrees require a minimum of 30 credit hours with a minimum of 24 hours in history.

Code	Title	Credits
HIST 702	Historiography	3
HIST 705	Directed Research (taken during second year)	1
HIST 710	Research Seminar in North American History	3
Select six credits of the following (one to be in the student's major area and the other the minor area)		**6**
HIST 730	Readings in North American History	
HIST 760	Readings in European History	
HIST 780	Readings in World History	

History coursework numbered 601 or higher		6-9
HIST 798	Master's Thesis	8
Total Credits		**30-33**

Master of Science Degree

Code	Title	Credits
HIST 702	Historiography	3
HIST 710	Research Seminar in North American History	3
HIST 730	Readings in North American History	3
HIST 760	Readings in European History	3
HIST 780	Readings in World History	3
601 or above courses (Up to 3 credits may be taken from outside of the history department.)		12
HIST 797	Master's Paper	3
Total Credits		39

Ph.D. Degree

The department offers a Doctor of Philosophy degree in History. The Ph.D. in History is a research degree. It requires the successful defense of a dissertation based on primary sources that makes an original contribution to knowledge. We only admit students who already hold an M.A. in History or another very closely related field.

Foreign language requirements vary from field to field. One foreign language is required for students in the U.S. field. At least two foreign languages are required for all others, depending on the languages needed to conduct research and access the secondary literature. The language requirement can be met by completing college coursework in that language through the second year (e.g., SPAN 202) or by passing a language exam administered by the faculty.

Code	Title	Credits
Course Requirements		**60-90**
HIST 702	Historiography	
HIST 705	Directed Research	
HIST 710	Research Seminar in North American History	
Readings courses (Any of them may be repeated for credit, provided the topics are different.)		**6**
HIST 730	Readings in North American History	
HIST 760	Readings in European History	
HIST 780	Readings in World History	
6xx - level or higher courses (At least 3 and no more than 6 of these credits must come from non-HIST courses)		**15**
HIST 899	Doctoral Dissertation	

Ashley Baggett, Ph. D.
Louisiana State University, 2014
Field: Women's History/Gender Studies, 19th century U.S., Southern History

Tracy Barrett, Ph.D.
Cornell University, 2007
Field: East and Southeast Asia, Overseas Chinese

Bradley Benton, Ph.D.
University of California, Los Angeles, 2012
Field: Latin American History, Colonial Mexico; Nahua (Aztec) Politics, Society, and Culture; the Early Modern Atlantic World; Cross-Cultural Contact and Exchange.

John K. Cox, Ph.D.
Indiana University, 1995
Field: Eastern Europe, Russia, Germany, Ottoman Empire

Mark Harvey, Ph.D.
University of Wyoming, 1986

Field: American West, Environmental History, Public History

Thomas D. Isern, Ph.D.
Oklahoma State University, 1977
Field: History and Folklore of the North American Plains, History of Agriculture

Don Johnson, Ph.D.
Northwestern University, 2015
Field: Colonial and Revolutionary America History

Marcela Perett, Ph.D.
The Medieval Institute, University of Notre Dame, 2009
Field: Late Antiquity, Medieval Europe, Renaissance & Reformation

Angela Smith, Ph.D.
Middle Tennessee State University, 2011
Field: Public History, 20th Century American History, Cultural History, Digital History

Horticulture and Urban Agriculture

Department Information

- **Department Head:**
  Richard Horsley, Ph.D.
- **Graduate Coordinator:**
  Marisol Berti, Ph.D.
- **Department Location:**
  166 Loftsgard Hall
- **Department Phone:**
  (701) 231-7971
- **Department Web Site:**
  www.ag.ndsu.edu/plantsciences/ (http://www.ag.ndsu.edu/plantsciences/)
- **Application Deadline:**
  International applications must be completed with the Graduate School by October 1 for spring, March 1 for summer, and May 1 for fall. • Domestic applications should completed with the Graduate School at least 2 months prior to the start of classes.
- **Credential Offered:**
  M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

The Department of Plant Sciences offers graduate studies leading to the Master of Science (M.S.) degree in Horticulture and Urban Agriculture. Areas of specialization in Horticulture include breeding and genetics, biotechnology, physiology, propagation, public horticulture, sports and urban turf grass management, and production and management of horticultural crops such as woody plants, potatoes, vegetables, and herbaceous ornamentals.

The Horticulture and Urban Agriculture is located in Loftsgard Hall, which provides a state-of-the-art facility for collaborative research in plant sciences, ranging from basic studies and biotechnology to the more traditional applied areas. Campus also offers state-of-the-art greenhouses and extensive growth chamber facilities, as well as field plots including an orchard and vineyard.

The NDSU Horticulture Research Farm is located 25 miles west of campus with research plots involving high value crops, woody ornamental plants, and certified organic. Located within the NDSU Horticulture Research Farm is the NDSU Dale E. Herman Research Arboretum. This arboretum is the largest collection of woody ornamental plants in all the Northern Great Plains.

Graduate student numbers per faculty member are limited, so the student gets adequate personal attention and works closely with their adviser in research. Final selection of the adviser will be made on the basis of the student's interest, availability of space in the researcher's laboratory, and a common desire of the student and professor to work together.

The Horticulture and Urban Agriculture graduate program is open to all qualified graduates of universities and colleges of recognized standing. Applications must be submitted directly to the NDSU Graduate School. To be admitted with full status to the program, the applicant must meet Graduate School and department admission requirements.

For admission requirements visit https://www.ndsu.edu/gradschool/apply (https://www.ndsu.edu/gradschool/apply/)

Financial Assistance

Correspondence with one or more departmental faculty members before and during the application process is not compulsorily but is encouraged. Applicants will not be considered without a department faculty member who has agreed to serve as the major advisor and can offer a Graduate Research Assistantship (GRA). To read more about our research teams and find faculty contact information, please visit https://www.ndsu.edu/agriculture/academics/academic-units/plant-sciences/research (https://www.ndsu.edu/agriculture/academics/academic-units/plant-sciences/research/).

A twenty-hour (half-time) GRA is provided to each accepted student based on scholarship and potential to undertake advanced study and research. The annual stipend varies based on the research project and will not be less than $20,000 annually.

In addition to the stipend, graduate assistants who meet the hours worked and training requirements each semester receive a graduate tuition waiver. Students are responsible for differential tuition, student and course fees, and tuition for non-graduate level credits taken.

The Horticulture and Urban Agriculture program has numerous annual scholarships ranging from $1000 to $1500 each for outstanding Horticulture graduate students.

Degree Requirements

In the first year, each student, in conjunction with their advisor, will form a supervisory committee, create a plan of study that meets disciplinary requirements below as well the goals of the student, and develop a research proposal paper for submission to the department.

The M.S. program requires the completion of at least 30 credits, during which an overall GPA of 3.0 or better must be maintained. The M.S. degree may be earned by either of two options. The Plan A: Thesis Option emphasizes completion of a research project. The Plan B: Comprehensive Study Option requires more course work and instead of conducting research and presenting a thesis, the candidate presents a paper or papers to the supervisory committee, demonstrating ability for scholarly study and written expression.

Candidates working toward either Plan A or Plan B must pass an oral defense, present a public Exit Seminar on the thesis research or comprehensive study, and have their thesis/paper accepted by the Graduate School to complete the degree.

Code	Title	Credits
M.S. Plan A - Thesis Option		**30**
Required Courses		
PLSC 724	Field Design I	3
PLSC 790	Graduate Seminar	1
PLSC 798	Master's Thesis	10
Additional Credits (13 credits must be didactic)**		**16**
Students focusing on Plant Breeding and Genetics must take and earn a B or better in		
PLSC 718	Genetics & Plant Improvement	
PLSC 631	Intermediate Genetics	

Code	Title	Credits
M.S. Plan B - Master's Paper Option		**30**
PLSC 724	Field Design I	3
Additional 600-700 level courses (18 credits must be didactic**)		21
PLSC 790	Graduate Seminar	1
PLSC 797	Master's Paper	3

** Didactic credits are graduate courses numbered 601-689, 691; 700-789, 791; and 800-889, 891.

Faculty

David Wenhao Dai, Ph.D.
North Dakota State University, 2001
Research Interests: Woody Plant Physiology, Biotechnology

Harlene Hatterman-Valenti, Ph.D.
Iowa State University, 1993
Research Interests: High-Value 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

Esther E. McGinnis, Ph.D.
University of Minnesota, 2013
Research Interests: Extension Horticulture, Native Plants, Perennial Hardiness, Floriculture

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

Alan J. Zuk, Ph.D.
Kansas State University, 2005
Research Interests: Sports and Urban Turfgrass Management

Human Development and Family Science

Department Information

- **Department Head:**
  Joel Hektner, Ph.D.
- **Department Location:**
  Evelyn Morrow Lebedeff Hall
- **Department Phone:**
  (701) 231-8268
- **Department Web Site:**
  www.ndsu.edu/hdfs/academics/masters_degree/ (http://www.ndsu.edu/hdfs/academics/masters_degree/)
- **Application Deadline:**
  One month prior to the beginning of each term. Applications accepted for fall, spring, and summer.
- **Credential Offered:**
  M.S., Certificate
- **English Proficiency Requirements:**
  TOEFL iBT 100 (subscores of at least 24 for speaking and 21 for writing); IELTS 7 ; Duolingo125

Program Description

Programs of study leading to a Graduate Certificate or the Master of Science degree are offered in three options: Family Financial Planning, Youth Development, and Gerontology. All of these options are available via a collaborative, inter-institutional program offered through online distance education. Each program requires a capstone practicum or case study experience to complete the M.S. degree. Students can complete the M.S. programs in two to three years and the certificate programs in one calendar year.

The **Family Financial Planning (FFP)** M.S. option is a 30-credit program with a specific curriculum approved by the Certified Financial Planner (CFP) Board of Standards. Graduate certificates (18 credits) are available in Financial Planning and in Financial Counseling.

The **Gerontology** M.S. option requires 30 credits, and the Graduate Certificate requires 12 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 (12 credits) are available in Youth Development and in Youth Program Management and Evaluation. Youth development is an emerging professional field. It has a positive orientation, meaning its focus is on promoting the

positive development of youth, and it is an applied field, with professionals who put developmental research and theory into practice in structuring and implementing programs and services for adolescents.

In addition to the Graduate School's required application requirements, submit the statement of purpose indicating reasons for pursuing graduate study, specifying your special interests within your chosen discipline and including your background preparation in that area. Mention any relevant skills or experience you have acquired. In addition, be sure to address the following, in 500 words or less:

1. How your interest in this field developed.
2. Why you chose our program at NDSU.
3. The experiences you have had (e.g. informal, academic, employment, volunteer) that you see as related to this graduate program or your professional goals.
4. What your professional goals are and how this graduate program will help you accomplish your professional goals.

Family Financial Planning

Code	Title	Credits
HDFS 677	Financial Counseling	3
HDFS 762	Retirement Planning, Employee Benefits and the Family	3
HDFS 763	Personal Income Taxation	3
HDFS 765	Insurance Planning for Families	3
HDFS 766	Estate Planning for Families	3
HDFS 769	Financial Planning Case Studies	3
HDFS 770	Fundamentals of Financial Planning	3
HDFS 771	Investing for the Family's Future	3
Electives		6
HDFS 740	Theories & Research in Family Financial Planning I	
HDFS 741	Theories & Research in Family Financial Planning II	
HDFS 767	Professional Practices in Family Financial Planning	
HDFS 768	Housing/Real Estate	
HDFS 772	Military Personal Financial Readiness	
HDFS 794	Practicum/Internship	
Other elective approved by advisor		
Total Credits		**30**

Gerontology

Code	Title	Credits
HDFS 723	Foundations in Integrative Aging Studies	3
HDFS 721	Contemporary Perspectives on Adult Development and Aging	3
3 credits from Block 2:		**3**
HNES 652	Physical Health, Wellness, Nutrition and Active Aging	
HDFS 725	Socioemotional and Cognitive Well-being throughout Adulthood	
HDFS 790	Graduate Seminar (Focused on the Aging Individual)	
3 credits from Block 3:		**3**
HDFS 726	Family Relationships and Aging	
ADHM 705		
HDFS 790	Graduate Seminar (Focused on Aging in Context)	
3 credits from Block 4:		**3**
HDFS 760	Aging Policy and Advocacy	
HDFS 761	Implementation of Community Programs for Older Adults	
HDFS 722	Applied Research Methods and Evaluation of Aging Programs	
HDFS 790	Graduate Seminar (Focused on Translational Practice)	
HDFS 794	Practicum/Internship	3

12 credits of electives selected from any of the above courses	12
Total Credits	**30**

Youth Development

Code	Title	Credits
HDFS 710	Foundations of Youth Development	3
HDFS 711	Youth Development	3
HDFS 712	Positive Youth Development in Community Settings	3
HDFS 713	Adolescents and Their Families	3
HDFS 716	Youth Professionals as Consumers of Research	3
HDFS 717	Design and Evaluation of Youth Programs	3
HDFS 718	Youth Development Personnel and Program Management	3
HDFS 719	Youth Policy	3
HDFS 730	Youth-Adult Relationships	3
HDFS 794	Practicum/Internship	3
Electives (select 2 courses)		6
HDFS 714	Contemporary Youth Issues (*)	
HDFS 715	Youth Culture	
HDFS 790	Graduate Seminar (*)	
HDFS 794 Practicum/Internship (Additional hours)		
Total Credits		**36**

*Upon approval of topic by adviser. Can be taken more than once with different topics.

Family Financial Planning

Select one of the options: Financial Planning or Financial Counseling

Code	Title	Credits
Financial Planning Option		
HDFS 762	Retirement Planning, Employee Benefits and the Family	3
HDFS 763	Personal Income Taxation	3
HDFS 765	Insurance Planning for Families	3
HDFS 766	Estate Planning for Families	3
HDFS 769	Financial Planning Case Studies	3
HDFS 771	Investing for the Family's Future	3
Total Credits		**18**

Code	Title	Credits
Financial Counseling Option		
HDFS 677	Financial Counseling	3
HDFS 740	Theories & Research in Family Financial Planning I	3
HDFS 768	Housing/Real Estate	3
HDFS 770	Fundamentals of Financial Planning	3
Select 6 credits of the following:		6
HDFS 741	Theories & Research in Family Financial Planning II	
HDFS 762	Retirement Planning, Employee Benefits and the Family	
HDFS 763	Personal Income Taxation	
HDFS 765	Insurance Planning for Families	
HDFS 766	Estate Planning for Families	
HDFS 771	Investing for the Family's Future	
HDFS 772	Military Personal Financial Readiness	

HDFS 794	Practicum/Internship	
Total Credits		**18**

Gerontology

Code	Title	Credits
Required Courses		
HDFS 721	Contemporary Perspectives on Adult Development and Aging	3
HDFS 723	Foundations in Integrative Aging Studies	3
Elective Courses- Select 2		6
HNES 652	Physical Health, Wellness, Nutrition and Active Aging	
ADHM 705		
HDFS 722	Applied Research Methods and Evaluation of Aging Programs	
HDFS 725	Socioemotional and Cognitive Well-being throughout Adulthood	
HDFS 726	Family Relationships and Aging	
HDFS 760	Aging Policy and Advocacy	
HDFS 761	Implementation of Community Programs for Older Adults	
HDFS 790	Graduate Seminar (*)	
Total Credits		**12**

Youth Development

Code	Title	Credits
HDFS 710	Foundations of Youth Development	3
HDFS 711	Youth Development	3
Select 2 courses from the following:		6
HDFS 712	Positive Youth Development in Community Settings	
HDFS 713	Adolescents and Their Families	
HDFS 714	Contemporary Youth Issues [1]	
HDFS 715	Youth Culture	
HDFS 719	Youth Policy	
HDFS 730	Youth-Adult Relationships	
HDFS 790	Graduate Seminar [1]	
Total Credits		**12**

1

With approval of topic by advisor.

Youth Program Management and Evaluation

Code	Title	Credits
HDFS 710	Foundations of Youth Development	3
HDFS 717	Design and Evaluation of Youth Programs	3
HDFS 718	Youth Development Personnel and Program Management	3
Select one course from the following:		3
HDFS 712	Positive Youth Development in Community Settings	
HDFS 714	Contemporary Youth Issues [1]	
HDFS 719	Youth Policy	
HDFS 790	Graduate Seminar [1]	
Total Credits		**12**

1

With approval of topic by advisor.

James Deal, Ph.D.
University of Georgia, 1987
Research Interests: Identity Development in Emerging Adults, Particularly in the Areas of Religion and the Transition to College; First Generation and/or Low Income Students and Issues Related to Financial Support

Margaret Fitzgerald, Ph.D.
Iowa State University, 1997
Research Interests: Family Owned Businesses--copreneurial couples, women and minority-owned businesses, the interface between the business, family and community, and managerial adjustment strategies.

Heather Fuller, Ph.D.
University of Michigan, 2009
Research Interests: Social Relationships and Well-Being Across the Lifespan (e.g. Intergenerational Relationships); Successful Aging and Health Promotion; Aging in Rural and Cross-Cultural Contexts; Aging Families and Caregiving; Survey Research and Program Evaluation

Joel Hektner, Ph.D.
University of Chicago, 1996
Research Interests: Design and Effectiveness of Programs to Prevent Adjustment Problems and Promote Well-Being in Children and Adolescents; Peer Affiliation Patterns and Peer Influences on Children's Behaviors; Family and School Conditions that Facilitate Optimal Experiences (Flow) and Optimal Development; the Experience Sampling Method

Leanna McWood, Ph.D.
Auburn University, 2020
Research Interests: Extracurricular Involvement; Social Relationships; Contextual Influences; Sleep; Adolescent Development

Natira Mullet, Ph.D.
Texas Tech University, 2020
Research Interests: Intergenerational, cultural and familial protective factors to reduce interpersonal trauma and resulting substance use and mental health outcomes among marginalized communities.

Melissa O'Connor, Ph.D.
University of South Florida, 2010
Research Interests: Examining Age-Related Differences and Changes in Cognitive and Functional Abilities, Such as Driving, Among Healthy Adults and Clinical Populations; Quantitative Methods and Psychometrics; Interventions for Improving Cognition, Health, and Everyday Functioning; and Attitudes Toward Dementia

Industrial and Manufacturing Engineering

Department Information

- **Department Chair:**
  Kambiz Farahmand, Ph.D.
- **Program Coordinator:**
  Mojahid Saeed Osman, Ph.D.
- **Department Location:**
  106 Engineering
- **Department Phone:**
  (701) 231-9818
- **Department Web Site:**
  www.ndsu.edu/ime/ (http://www.ndsu.edu/ime/)
- **Application Deadline:**
  International applications due March 1 for fall; August 15 for spring and summer. Domestic applications due one month prior to start of semester.
- **Credential Offered:**
  Ph.D., M.S., M.Eng.
- **Test Requirement:**
  GRE - General
- **English Proficiency Requirements:**
  TOEFL ibt 71; IELTS 6.0; Duolingo 105

The mission of the graduate program in the IME Department at NDSU is to advance knowledge and research of industrial and manufacturing engineering, strengthen and support industry, and enhance teaching. We currently offer three graduate degrees in Industrial & Manufacturing Engineering:

1) Master of Science (M.S.): A thesis-based master's degree program designed to equip students with the ability to analyze, design, and manage industrial and manufacturing systems as well as enable students to develop scholarly abilities to further pursue a Ph.D. degree in industrial and manufacturing engineering (or a related field).

2) Master of Engineering (M.E.): Designed to provide a graduate education option for professionals who do not have the time resources for a full-fledged master's research option and developing a thesis. Various areas of emphasis are available for students pursuing this option.

3) Doctor of Philosophy (Ph.D.): A research-intensive degree, the Ph.D. in Industrial and Manufacturing Engineering is conferred in recognition of marked original research and high scholastic attainment. This degree is awarded following the successful defense of an acceptable dissertation summarizing substantial results of a student's original research work. Areas of specialization for research encompass a wide range of topics, including but not limited to 3D printing, applied statistics and probability, biomedical science, experimental design, data mining and machine learning, healthcare, manufacturing, operations research, quality control theory, reliability, simulation, and sustainability.

For more information about our department and programs, please visit our department website at www.ndsu.edu/ime/.

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, all applicants must submit a GRE score that meets the following requirements:

- 310 or higher (Verbal + Quantitative), 160 Quantitative minimum and Analytical Writing score of 3.5 or better

International students must also meet the following English proficiency requirements:

- Minimums for admission: TOEFL: 71 IELTS: 6.0 Duolingo: 105
- Minimums for TA Graders: TOEFL: 79 IELTS: 6.5 Duolingo: 110
- Minimums for TA Instructors: TOEFL: 81 IELTS: 7.0 Duolingo: 115

Financial Assistance

There are a limited number of teaching assistantships available in Industrial and Manufacturing Engineering, which are normally assigned as support for classes with large enrollments and/or heavy laboratory content. Research assistantships are offered when student's capabilities and background experience match the needs of the project. While teaching assistantships are funded by the department, 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 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 student's thesis or dissertation may or may not be in the area of their job duties for the assistantship.

Graduate students awarded a full-time assistantship (20 hours/week) are eligible for a full tuition waiver that covers the cost of base tuition. Graduate students holding a part-time assistantship (greater than or equal to 10 hrs./week, but less than 20 hrs./week) are eligible for a 50% tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits. Students receiving tuition waivers will be required to enroll in a minimum of 6 credits per semester. Students are eligible to receive a tuition waiver until the maximum number of credits shown below is reached, based on degree type:

- Master's degree - 33 credits
- PhD degree (with Master's) - 63 credits
- PhD degree (without Master's) - 93 credits

Degree Requirements

The Master of Science degree in Industrial and Manufacturing Engineering requires 30 credits of graduate-level study.

- A minimum of 15 credits from *didactic IME* courses(numbered IME 601-689 and IME 700-789) are required.
- In addition, a minimum of 6 credits of *other courses* are required for funded student (no matter GTA or GRA). This part of the course credits may come from approved graduate level courses of other departments. If a student is funded by himself/herself, then the minimum requirement of other courses is 8 credits.
- A minimum of 3 credits (i.e., from three semesters) from IME *graduate seminar* (IME 790) are required for a funded student (no matter GTA or GRA). If a student is self-funded, then the minimum requirement for the graduate seminar is 1 credit.
- 6 credits of thesis (IME 798) are required towards the M.S. degree.
- Prior to graduation, all M.S. graduate students are required to have submitted one paper that has been accepted by a refereed journal or refereed conference. The submitted paper is expected to be based on their thesis research.

The Master of Engineering degree in Industrial and Manufacturing Engineering requires 30 credits of graduate-level study and a written examination.

- A minimum of 30 credits from *didactic IME* courses (numbered IME 601-689 and IME 700-789) are required.
- 15 credits are required 600-level IME courses.
- At least 3 credits of 700-level courses are required, which cannot be double counted as an elective.
- A minimum of 12 credits of IME electives is required, at most 6 credit hours of 600+ level courses from outside the department are allowed with department approval.
- A maximum of 8 transfer credits are allowed.
- Funded students are not eligible for this program.
- A minimum of a 3.0 GPA is required for graduation.
- Prior to graduation, all M.E. graduate students are required to have a passing grade on the written examination.

The Doctor of Philosophy degree requires 60 credits beyond the M.S. requirement (90 credits total).

For students who are enrolled with a M.S. degree, the course credit requirements *beyond the M.S.* degree are:

- A minimum of 15 credits from *didactic IME courses* (IME 601-689 and 700-789), with at least 9 credits from 700-level IME courses. If courses are not offered in a timeline that meet the students' requirements, it is possible for waiver/substitution requests.
- A minimum of 12 credits of *other courses* are required. This part of the course credits may come from approved graduate level courses of other departments.
- A minimum 3 credits of *Graduate Seminar* (IME 790).
- A minimum of 30 credits of *dissertation* (IME 899).
- Prior to graduation, all Ph.D. graduate students are required to have submitted two papers that have been accepted by refereed journal or refereed conference. The submitted papers are expected to be based on their dissertation research.

For students who are enrolled with a bachelor's degree, the course credit requirements are:

- A minimum of 30 credits from *didactic IME courses* (IME 601-689 and 700-789), with at least 9 credits from 700-level IME courses. If courses are not offered in a timeline that meet the students' requirements, it is possible for waiver/substitution requests.
- A minimum of 27 credits of *other courses* are required. This part of the course credits may come from approved graduate level courses of other departments.
- Among these 57 course credits, at least 30 of them must be 700-level courses. For example, if a student opts for 9 credits of 700-level IME courses, they are required to enroll in a minimum of 21 credits of 700-level courses offered by other departments.
- A minimum 3 credits of Graduate Seminar (IME 790).
- A minimum of 30 credits of dissertation (IME 899).
- Prior to graduation, all Ph.D. graduate students are required to have submitted two papers that have been accepted by refereed journal or refereed conference. The submitted papers are expected to be based on their thesis or dissertation research.

For either the M.S. or Ph.D., all courses taken outside of the IME Department must be approved in advance by the student's academic adviser. The total courses of study must be approved by the student's academic adviser, POS (plan of study) committee, and department chair. Students completing graduate degrees within the IME Department are expected to exhibit demonstrable expertise in the core competencies of either industrial engineering or manufacturing engineering. Students whose undergraduate major is in another field may be required to show proficiency in basic IME subjects. For further information in this regard, please consult the IME department.

Each new student must have an academic advisor and select their POS committee by the end of their 1st semester of study (see IME grad handbook for requirements). This committee will be chaired by the faculty adviser and will provide direction, advice and examination of the student's work and achievement. All students must consult with their major advisor and submit a plan of study (POS) by the end of the 1st semester for Master's students and 2nd semester PhD students. Once approved, the POS will provide direction for the remainder of the student's degree work.

Faculty List

Canan Bilen-Green, Ph.D..
University of Wyoming, 1998
Research Interests: Statistical Process Control, Quality Management

Kambiz Farahmand, Ph.D., P.E.
University of Texas, 1992
Research Interests: Ergonomics Design, Layout Planning and Management

Reza Maleki, Ph.D.
North Dakota State University, 1989
Registered Professional Industrial Engineer (P.E.)

Certified Manufacturing Engineer

Lokesh Narayanan, Ph.D.
North Carolina State University, 2019
Research Interests: Biomedical Design, Bio-Manufacturing and Automation

Diana Lopez-Soto, Ph.D.
Tecnologico de Monterrey, Mexico, 2016
Research Interests: Healthcare Systems Engineering and Analytics, Supply Chain, and Operations Management

Harun Pirim, Ph.D.,
Mississippi State University, 2011
Research Interests: Discrete Optimization, Machine Learning, Biological Networks, & Data Analytics

Mojahid Saeed Osman, PhD
North Carolina A & T State University, 2010
Research Expertise: Large-scale network routing & scheduling, supply chain modeling, Production systems design

International Agribusiness

Department Information

- **Department Chair:**
  Cheryl Wachenheim, Ph.D.
- **Graduate Coordinator:**
  Siew Lim, Ph.D.
- **Department Location:**
  500 Barry Hall
- **Department Phone:**
  (701) 231-7441
- **Department Web Site:**
  www.ag.ndsu.edu/agecon/ (http://www.ag.ndsu.edu/agecon/)
- **Application Deadline:**
  March 1 for fall semester, October 1 for spring semester
- **Credential Offered:**
  M.S.
- **Test Requirement:**
  GRE or GMAT
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

Program Description

The International Agribusiness M.S. program offered by the Department of Agribusiness and Applied Economics at North Dakota State University provides both the academic training and the international experience required to excel in an international agribusiness career. The program of study includes course work in applied economics, quantitative methods, and international agribusiness strategy, management, finance, and marketing.

Students are required to have an international experience that may be satisfied by meeting one of three options::

1. The student may participate in an international internship. Both paid and unpaid opportunities exist with international agribusiness companies, with government agencies, or with nonprofit organizations. The semester-long or summer internship can be arranged by the student or in cooperation with NDSU's Office of International Student and Study Abroad Services. Internship programs will be defined by the student and his or her major adviser, and approved by the Graduate Program Committee (GPC) and the student's supervisory committee.
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.

In addition to the Graduate School admission requirements (https://bulletin.ndsu.edu/graduate/admission-information/), applicants must have earned a grade of B or higher in intermediate microeconomics and statistics including linear regression, and a grade of C or better in calculus.

Applicants must submit their complete application by March 1 for fall enrollment and October 1 for spring enrollment to guarantee admission and funding consideration. Admission will only be considered for candidates who submit a complete application.

It is desirable that students begin their program in the fall semester, although students may begin their program in the spring.

Financial Assistance

The Department offers assistantships on a competitive basis. Granting assistantships depends on academic performance, departmental needs, and availability of assistantships. Graduate Research Assistantships (GRAs) provide monthly stipends. Students on assistantship perform research or teaching duties in the department in return for their stipend. Most assistantships are half-time (20 hours per week) or one-quarter-time (10 hours per week). Assistantships are typically limited to 16 months.

In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

Assistantships do not begin until the first semester of full graduate standing when courses that apply for the Master of Science degree are taken.

Students must complete all core courses. Students select elective courses, approved by their advisor and supervisory committee, to fulfill the remaining credit requirements.

The core requirements assure breadth and competence in key areas of knowledge and professional activity. Students may participate in an international internship, a study aboard program, or select six additional credits of course work at NDSU related to international agribusiness.

Code	Title	Credits
Core Courses		
AGEC 701	Research Methods	1
AGEC 711	Applied Risk Analysis I	3
AGEC 712	Applied Risk Analysis II	3
AGEC 741	Advanced Microeconomics	3
AGEC 744	Agribusiness I: Agricultural Product Marketing and Agribusiness Strategy	3
AGEC 797	Master's Paper	1-10
or 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	
Or other approved quantitative coursework		
Approved Electives		**1 - 9**
Total Credits		30 (minimum)

Kwame Addey, Ph.D.
North Dakota State University, 2023
Research Interests: International Trade, and Financial Markets (Statistical Arbitrage)

Jon Biermacher, Ph.D.
Oklahoma State University, 2005
Research Interests: Economics of Livestock Production, Crop Production and Marketing Systems, Technology and Biotechnology Adoption, and Rural and Community Economic Development

David Bullock, Ph.D.
Iowa State University, 1989
Research Interests: Futures and Options Markets, Over-The-Counter Derivatives, Trading, Risk Management, Agrifinance, Monte Carlo Simulation, and Big Data Applications in Agriculture

James Caton, Ph.D.
George Mason University, 2016
Research Interests: Entrepreneurship Agent-based Computational Economics, Market Process Theory, Monetary Economics

Erik Hanson, Ph.D.
University of Minnesota, 2016
Research Interests: Agricultural Finance, Farm Management, Marketing and Production Economics

Ron Haugen, M.S.
North Dakota State University, 1989
Research Interests: Farm Management

Robert Hearne, Ph.D.
University of Minnesota, 1995
Research Interests: Natural Resource and Environmental Economics

Jeremy Jackson, Ph.D.
Washington University in St. Louis, 2008
Research Interests: Microeconomics, Political Economy, Public Finance

Thomas Krumel, Ph.D.
University of Connecticut, 2020
Research Interests: Rural Development, Labor Demand, and Labor Market Skills Mismatch

Siew Hoon Lim, Ph.D.
University of Georgia, 2005
Research Interests: Production Economics, Transportation, Industrial Organization

Raymond March, Ph.D.
Texas Tech University, 2017
Research Interests: Public and Private Provision and Governance of Health Care in the United States

Dragan Miljkovic, Ph.D.
University of Illinois, 1996
Research Interests: Agricultural Prices, International Trade, Agricultural and Food Marketing and Policy

William Nganje, Ph.D.
University of Illiniois at Urbana-Champaign, 1999
Research Interests: Agricultural Finance, Food Safety Economics

Frayne Olson, Ph.D.
University of Missouri, 2007
Research Interests: Crop Marketing Strategies, Crop Supply Chain Management, Agricultural Contracting, Agricultural Risk Management

Bryon Parman, Ph.D.
Kansas State University, 2013
Research Interests: Whole Farm and Agribusiness Financial Structure, Risk Management, Land Values and Rents, and Farm Financial Trends

Timothy Petry, M.S.
North Dakota State University, 1973
Research interests: Livestock Marketing

Veeshan Rayamajhee, Ph.D.
University of New Mexico, 2019
Research Interests: Individual and Collective Responses to Covariate Shocks

David Ripplinger, Ph.D.
North Dakota State University, 2011
Research Interests: Production Economics and Marketing

David Roberts, Ph.D.
Oklahoma State University, 2009
Research Interests: Natural Resource and Environmental Economics, Econometrics, Production Agriculture

Anupa Sharma, Ph.D.
Virginia Polytechnic Institute and State University, 2016
Research Interests: Economics, Agriculture Business and Management

Sandro Steinbach, Dr. Sc.
ETH Zurich, Swiss Federal Institute of Technology, 2018

Research Interests: International Trade and Agricultural Policy

Cheryl J. Wachenheim, Ph.D.
Michigan State University, 1994
Research Interests: Agribusiness

William W. Wilson, Ph.D.
University of Manitoba, 1980
Research Interests: Commodity Marketing, Agribusiness, Industrial Organization

Landscape Architecture

Department Information

- **Department Chair:**
  Dominic L. Fischer, MLA, PLA
- **Department Location:**
  Klai Hall
- **Department Phone:**
  (701) 231-6151
- **Department Web Site:**
  www.ndsu.edu/landscapearchitecture/ (http://www.ndsu.edu/landscapearchitecture/)
- **Application Deadline:**
  February 1 for fall semester, portfolio required
- **Credential Offered:**
  Master of Landscape Architecture
- **English Proficiency Requirements:**
  TOEFL ibt 80; IELTS 6.5; Duolingo 105

North Dakota State University (NDSU) offers a 5-year LAAB accredited, first-professional Master of Landscape Architecture degree. The department and program are housed primarily in two beautifully restored historic industrial buildings in downtown Fargo, which has emerged as an exciting, student-oriented urban district. Most students entering the graduate program in landscape architecture come directly from the NDSU pre-professional Bachelor of Science in Environmental Design program or apply after completing Professional Design Degrees from other accredited Universities. The curriculum includes field trips to cities nationwide and is supported by a professionally staffed wood shop, multiple digital media labs, laser cutter, 3D printing, and model-making rooms. Both traditional and digital media used in professional practice 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 Landscape Architectural Accreditation Board (LAAB), which is the sole agency authorized to accredit professional degree programs in landscape architecture offered by institutions with U.S. has a mission to evaluate, advocate for, and advance the quality of education in professional program leading to a degree in landscape architecture.

Career Opportunities

The profession of landscape architecture is one of only 60 professions to be licensed in all 50 states, and is projected to continue growing for the next 10-20 years. Landscape architects work for professional design firms, government agencies like the National Park Service, city planning offices and other multi-disciplinary offices in the architecture and engineering fields. With their unique skill set, landscape architects work to improve human and environmental health in all communities. They plan and design parks, campuses, streetscapes, trails, plazas, residences, and other projects that strengthen communities.

Admission Requirements

- Students currently enrolled in the 4-year pre-professional degree at NDSU may apply to the Master of Landscape Architecture program.
- Transfer students with pre-professional or professional degrees in landscape architecture or architecture from another school may be considered for admission to years 4 and 5 in the program, based on test scores, GPA, and portfolio review. Transfer students should contact the department directly before application to the Graduate School.
- Candidates must have earned a cumulative grade point average of 3.0 to be considered for full-standing admission.

Leadership and Managerial Skills

Department Information

- **Program Coordinator:**
  Elizabeth Worth, M.Ed.
- **Email:**
  elizabeth.worth@ndsu.edu
- **Department Location:**
  Barry Hall
- **Department Phone:**
  (701) 231-6038
- **Department Web Site:**
  www.ndsu.edu/business/programs/graduate/graduate_certificates/ (http://www.ndsu.edu/business/programs/graduate/graduate_certificates/)
- **Credential Offered:**
  Graduate Certificate

The Leadership and Managerial Skills Graduate Certificate is designed to help participants improve their skills relating to decision making, communicating, negotiating, working in teams, and leading. In addition to learning theoretical aspects of these areas, the courses in the certificate also provide opportunities for students to improve their "soft skills" relating to working with other people and organizations.

Curriculum

The certificate requires 8 credits of study. Students must take four of the following five courses.

Code	Title	Credits
Select four of the following courses:		
MBA 731	Leading and Managing Teams	
MBA 732	Managerial Leadership: Essential Competencies	
MBA 733	Management Decision Making	
MBA 734	Negotiations	
MBA 736	Managing Conflict in Organizations	
Total credits		**8**

Leadership in Physical Education and Sport Coaching

Department Information

- **Program Coordinator:**
  Jenny Linker, Ph.D.
- **Email:**
  Jenny.Linker@ndsu.edu
- **Department Location:**
  School of Education - Family Life Center 210
- **Department Phone:**
  (701) 231-7101
- **Department Web Site:**
  ndsu.edu/education/ (http://ndsu.edu/education/)
- **Credential Offered:**
  M.Ed.

Leadership in Physical Education and Sport Coaching is an online program that prepares teachers, coaches, and sport leaders to become actively engaged in leadership roles within school systems or professional organizations. This degree prepares students to be master teachers, head coaches, department heads, and activities directors at the interscholastic level; assistant coaches, lecturers, and assistant or lead directors at the intercollegiate level; and to become actively engaged in leadership roles within professional organizations. Students in this option pay in-state tuition rates, despite location.

Admission Requirements

Admission is competitive and limited to 50 students. Applications are accepted on a rolling basis and students may be admitted for fall, spring, and summer semesters. Admitted out-of-state and international students are charged in-state tuition rates for this online program.

Admission requirements are as follows:

- Cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale.
- Undergraduate degree in physical education, coaching, sport management, education, or related field. Applicants with relevant experience that hold other degrees will also be considered.
- The GRE is NOT required.

A 3.0 is needed to be considered for full acceptance into the program. Applicants with an undergraduate GPA below 3.0 will be considered for conditional acceptance and will have to complete 6 graduate credit hours with grades of at least B to be considered for full standing. Meeting these criteria does not guarantee acceptance.

Code	Title	Credits
Required Courses		**9**
HPER 700	Research in Physical Education and Sport Coaching (Required)	
HPER 701	Leadership and Supervision in Physical Education and Sport Coaching	
HPER 712	Principles of Management in Physical Education and Coaching Settings	
Electives		**21**
HPER 705	Content Development and Instructional Practices in Physical Education and Coaching	
HPER 707	Social Issues in Sport, Physical Activity and Coaching	
HPER 708	Positive Youth Development in Physical Activity and Sport	
HPER 709	Laws of Leadership in Physical Education and Sport Coaching	
HPER 711	Physical Education Curriculum	
HPER 714	Legal Liability in Health, Physical Education, & Recreation	
HPER 715	Teaching Concepts-Based Fitness	
HPER 731	Governance in Sport Coaching	
HPER 736	Ethical Leadership in Coaching Sports	
HPER 737	School-wide Physical Activity Promotion	
HPER 738	Adapted Physical Education	
HPER 739	SEL via the Adventure Education Instructional Model	
HPER 745	Organization and Administration of Coordinated School Health Programs	
HPER 790 GRADUATE SEMINAR		
HPER 793 INDIVIDUAL STUDY		
HPER 794 INTERNSHIP		
Total Credits		**30**

Joe Deutsch, Ph.D.
North Dakota State University, 2007
Research Interests: Physical Education Teacher Education, Youth Sport Coaching

Brandon Foye, Ed.D.
Boston University, 2022
Research Interests: Physical Education, Teacher Education and Online Physical Education

Jenny Linker, Ph.D.
University of Illinois Urbana-Champaign, 2011
Research Interests: Comprehensive School Physical Activity Programs, Physical Education Teacher Preparation

Materials and Nanotechnology

Department Information

- **Program Director:**
  Erik K. Hobbie, Ph.D.
- **Email:**
  Erik.Hobbie@ndsu.edu
- **Department Phone:**
  (701) 231-6103
- **Department Web Site:**
  www.ndsu.edu/materials_nanotechnology/ (http://www.ndsu.edu/materials_nanotechnology/)
- **Application Deadline:**

April 1 for fall semester.

- **Credential Offered:**
  Ph.D.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

North Dakota State University (NDSU) offers an interdisciplinary program leading to the Master of Science (M.S.) and Doctor of Philosophy (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 materials and nanotechnology; and a final oral examination on the dissertation.

Admission Requirements

The program in Materials and Nanotechnology is open to qualified graduates of universities and colleges of recognized standing. Applicants 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 College requirements (https://catalog.ndsu.edu/graduate/admission-information/).

Financial Assistance

Students are routinely supported through research assistantships. Applicants are considered based on 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.

In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

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 supervisory 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 a graduate school representative

The plan of study will be prepared by the student, in consultation with the major adviser and supervisory committee, by the end of the first year in residence. The plan must be approved by the student's graduate supervisory committee, the MNT Program Director, and the Graduate College dean. Master's students must complete the plan of study by the end of the second semester of study. Doctoral students should complete the plan of study at the end of the first year of study and at least one month prior to the comprehensive oral examination

Master of Science

Materials and Nanotechnology students are able pursue a master's degree under either the Plan A - Master's Thesis or the Plan C - Culminating Experience option. Each option requires a minimum of 30 graduate credits with a cumulative grade point average of 3.0 or better.

The Plan A thesis option represents a more traditional Master of Science degree, with an independent research component in the form of an original thesis that can serve as a foundation for future doctoral work in science or engineering. For the thesis option, of the required minimum 30 graduate credits, at least 16 credits must be from approved graduate courses numbered from 601-689, 691, 700-789, and 791 while the research credits (798) must be not fewer than 6 nor more than 10.

The Plan C option is appropriate for working professional students or students who are certain that they do not wish to pursue a doctorate in any field of science or engineering. . In the context of the MNT program, this option requires a 6-10 credit culminating experience (794) which replaces the research credits (798).

Ph.D.

The doctorate requires a minimum of 90 graduate credits. A minimum of 27 credits of didactic coursework are required; no more than 15 didactic credits may be transferred as part of the Plan of Study. The MNT Ph.D. program requires students to complete a series of 7 core courses totaling 17 semester credits. The student will complete additional elective courses to fulfill the Graduate School requirement of 27 semester credits in academic courses. An overall GPA of 3.0 or better must be maintained.

Core Curriculum

Code	Title	Credits
MNT 729	Materials Characterization	3
MNT 730	Nanotechnology and Nanomaterials	3

MNT 732	Physical Properties of Materials	3
MNT 745	Preparing Future Researchers	1
MNT 756	Molecular Modeling	3
MNT 760	Materials Synthesis Processing	3
MNT 790	Graduate Seminar	1

Students must complete at least an additional 12 credits of graduate level coursework. The courses should be chosen by the students in consultation and with the approval of the student's supervisory committee.

Suggested courses include the following:

Code	Title	Credits
Microelectronics Focus		
ABEN 682	Instrumentation & Measurements	3
CPM 796	Special Topics	2
CHEM 766	Quantum Chemistry I	4
CHEM 767	Quantum Chemistry II	2
ENGR 780		3
ECE 751	Electromagnetic Theory and Applictions	3
IME 627	Packaging for Electronics	3
IME 720		3
IME 635	Plastics and Injection Molding Manufacturing	3
MNT 735		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	Applied Polymer Colloid Science	3
CPM 796	Special Topics	3
IME 720		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	Engineering with Polymeric Materials	3
CE 641	Finite Element Analysis	3
CE 720	Continuum Mechanics	3
CHEM 732	Advanced Survey of Analytical Chemistry	4
CHEM 736	Mass Spectrometry	2
CPM 673	Polymer Synthesis	3
ME 633		3
ME 751	Advanced Thermodynamics	3
PHYS 611	Optics for Scientists & Engineers	3
PHYS 781	Solid State Physics	3

Affiliated Faculty

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

Eugene B. Caldona, Ph.D.
Mississippi State University, 2020
Research Interests: Advanced coatings and materials, Corrosion, Electrochemistry, Surface chemistry, Nanocomposites

Yongki Choi, Ph.D.
City University of New York, 2010
Research Interests: Nano-bio-electronics, Carbon nanotube circuits, Single-molecule electronics, Biomedical applications

Andrew Croll, Ph.D.
McMaster University, Ontario, 2009
Research Interests: Polymers, Diblock copolymers, Thin films, Pattern formation, Mechanics

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

Erik K. Hobbie, Ph.D.
University of Minnesota, 1990
Postdoctoral: NRC Fellow, NIST, 1990-1992
Research Interests: Colloidal nanoparticles, Polymers, Complex fluids, Chromatography, Self-assembly, Photoluminescence, Flexible electronics

Syeed M. Iskander, Ph.D.
Virginia Polytechnic Institute and State University, 2019
Postdoctoral, University of Southern California, 2019-2020
Research Interests: Non-recyclable municipal solid waste management, Food waste management, Plastics pollution, Landfilling, and Landfill leachate management

Long Jiang, Ph.D.
Nanyang Technological University, 2003
Research Interests: Polymer/composite processing, Polymer processing machinery/design, Nanocomposites, Biobased polymers/composites, 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, Nanocomposites and biomaterials

Kalpana Katti, Ph.D.
University of Washington, 1996
Research Interests: Advanced composites, Nanomaterials, Biomaterials, Biomimetics, Materials characterization/modeling, Analytical electron microscopy, Bone tissue engineering

Dmitri Kilin, Ph.D.
Chemnitz University of Technology, Chemnitz, Germany, 2000
Research Interests: Photo-induced dynamic processes of charge transfer, Nonradiative charge carrier relaxation, Surfaces/interfaces of metal/semiconductor nanomaterials for photovoltaic/photocatalytic energy conversion

Svetlana Kilina, Ph.D.
University of Washington, 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, Transport in conjugated polymers

Andrei Kryjevski, Ph.D.
University of Washington, 2004
Research Interests: First-principles theoretical descriptions of the electronic properties of nanomaterials

Ivan T. Lima Jr., Ph.D.
University of Maryland, 2003
Research Interests: Photonics

Sylvio May, Ph.D.
Jena, 1996
Research Interests: Physics of lipid membranes, Biophysics

Keerthi Nawarathna, Ph.D.
University of Houston, 2005
Research Interests: Lab-on-a-chip technologies, Single-cell genomics, Nanobioengineering, Tissue engineering, Novel imaging techniques for biology, Computation/simulations

Selvakumar Prakash Parthiban, Ph.D.
Nagoya University, 2012
Research Interests: Biomaterials, Regenerative medicine, Tissue-engineered vascular grafts, Microvasculature, Decellularized extracellular matrix, Bioceramics, Cancer and vascular biology

Xiaoning Qi, Ph.D.
North Dakota State University, 2009
Research Interests: Corrosion characterization and prevention, Coating design and formulation, Sustainable coatings, Nanocomposites

Mohiuddin Quadir, Ph.D.
Freie University of Berlin, 2010
Research Interests: High performance delivery technologies, Biosynthetic interfaces for medical coatings, Synthesis of new polymers from bio-based resources

Seth C. Rasmussen, Ph.D.
Clemson University, 1994
Postdoctoral, University of Oregon, 1995-1999
Research Area: Inorganic/organic materials chemistry, Chemical history

Bakhtiyor Rasulev, Ph.D.
Uzbek Academy of Science, 2002
Postdoctoral, Drew University, 2002; Jackson State University, 2004-2007
Research Area: Structure-property studies of materials, Cheminformatics for materials, Modeling of nanomaterials interactions with biosystems, Nano-descriptors, Development of predictive structure-activity/toxicity models

Jing Shi, Ph.D.
Purdue University, 2004
Research Interests: Microelectronics packaging, Direct-write material deposition, Laser processing for electronics, RFID applications, Modeling of manufacturing processes, Computer integrated manufacturing

Mukund P. Sibi, Ph.D.
City University of New York, 1980
Postdoctoral, Dartmouth College, 1980-1982; University of Waterloo, 1982-1985
Research Interests: Synthetic organic chemistry, Natural products

Xiangqing (Annie) Tangpong, Ph.D.
Carnegie Mellon University, 2006
Research Area: Vibrations, dynamics and friction, friction-vibration interaction, friction damping in rotating structures, damping in nanocomposites and biomaterials

Chad A. Ulven, Ph.D.
University of Alabama at Birmingham, 2005
Research Interests: Advanced composites materials, Green materials processing, Nondestructive evaluation, Characterization of advanced materials under extreme conditions

Jessica Vold, Ph.D.
North Dakota State University, 2015
Research Interests: Additive manufacturing of materials, Polymer composites, Materials characterization, Entrepreneurship

Andriy Voronov, Ph.D.
Lviv Polytechnical Institute, 1994
Postdoctoral, Institute Charles Sadron, CNRS, 1997
Research Interests: Polymer synthesis and characterization

Alexander J. Wagner, Ph.D.
University of Oxford, 1997
Postdoctoral MIT, 1998-2000, Edinburgh, 2000-2002
Research Interests: Computational soft matter, Phase separation, Diffusion, Interface physics

Danling Wang, Ph.D.
University of Washington, 2013
Research Interests: Chemiresistive sensors, Semiconducting nanomaterials, Optical spectroscopy, Electronic devices, Microfabrication

Dean Webster, Ph.D.
Virginia Polytechnic Institute and State University 1984
Research Interests: Synthesis of high performance polymers, Polymerization reactions, Crosslinking chemistry, Quantitative structure-property relationship

Xiangfa Wu, Ph.D.
University of Nebraska-Lincoln, 2003
Beijing Institute of Technology, 1998
Research Interests: Nanofabrication/nanomaterials, Advanced functional composites, Fracture/impact mechanics

Wenjie Xia, Ph.D.
Northwestern University, 2016
Research Interests: Multiscale modeling, Mechanics of materials, Polymers and composites, Soft matter, Bioinspired materials, Mechanobiology

Qifeng Zhang, Ph.D.
Peking University, 2001
Postdoctoral, University of Washington, 2006-2008
Research Interests: Electronic materials, Nanomaterials: synthesis, characterization and device application, Nanotechnology, Materials/devices/technology for energy conversion and storage, Solar cells, Lithium ion batteries, Photocatalysis

Mathematics

Department Information

- **Department Chair:**
  Friedrich Littmann, Ph.D.
- **Graduate Coordinator:**
  Torin Greenwood, Ph.D.
- **Department Location:**
  408 Minard Hall
- **Department Phone:**

(701) 231-8171

- **Department Web Site:**
  www.ndsu.edu/math (http://www.ndsu.edu/math/)
- **Application Deadline:**
  Early review begins January 31 rolling through March 31 or until full.
- **Credential Offered:**
  Ph.D., M.S.

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 geometry, commutative algebra, and homological algebra
- analysis, including approximation theory, ergodic theory, harmonic analysis, and operator algebras
- applied mathematics, mathematical biology, differential equations, dynamical systems, neural networks
- combinatorics and graph theory
- geometry/topology, including differential geometry, geometric group theory, and symplectic topology

After passing their preliminary examinations, students are strongly urged to attend research seminars and discuss research opportunities with faculty members. By the end of their second semester, students select a supervisory committee and develop a plan of study specifying how all degree requirements are to be met. One philosophical tenet of the Department of Mathematics graduate program is that each mathematics graduate student will be well grounded in at least two foundational areas of mathematics. To this end, each student's background will be assessed, and the student will be directed to the appropriate level of study.

The Department of Mathematics graduate program is open to all qualified graduates of universities and colleges of recognized standing. In addition to the Graduate College requirements (p. 25), applicants must

- have earned a cumulative grade point average (CGPA) of at least 3.0 or equivalent in all advanced mathematics courses at the baccalaureate level and
- meet the English proficiency requirements (p. 25) for applicants.

Financial Assistance

Teaching assistantships and a small number of research assistantships are available. In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

To be eligible for a teaching assistantship, students must follow the English Language Proficiency Procedure for Graduate Teaching Assistants (https://catalog.ndsu.edu/graduate/graduate-school-policies/english-language-proficiency-procedure/#text) and be admitted in full-standing. In certain situations, students in conditional status may be eligible for assistantships.

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 Plan A Thesis Option or the Plan B 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

At least 30 credit hours in approved graduate-level mathematics course work, depending on the degree option.

1. 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. A grade of Master's Pass in two of the written preliminary examinations offered by the department. A thesis paper written under the supervision of a faculty member and defended at an oral examination administered by the student's supervisory committee.
2. 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 or in courses outside the Mathematics department. A grade of Master's Pass in two of the written preliminary examinations offered by the department. An expository paper written under the supervision of a faculty member and defended at an oral examination administered by the student's supervisory committee.

3. Exam Only Option: At least 30 credit hours in approved graduate-level mathematics course work. At least 21 credit hours in courses numbered 700-789, 800-889. These 21 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 or in courses outside the Mathematics Department. A grade of Ph.D. Pass in four of the written preliminary examinations offered by the department, and a passing grade in a preliminary oral examination administered by the student's supervisory committee after completion of the written preliminary examinations.

Timelines

Per departmental policy candidate has three calendar years from the time of enrollment in the Graduate College to complete the Master's degree. Extensions may be granted after review and approval by the graduate committee.

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.

Code	Title	Credits
Foundational Courses		
Algebra		
MATH 720	Algebra I	3
MATH 721	Algebra II	3
MATH 726	Homological Algebra	3
Analysis		
MATH 750	Analysis	3
MATH 754	Functional Analysis	3
MATH 756	Harmonic Analysis	3
Applied Mathematics		
MATH 760	Ordinary Differential Equations I	3
MATH 784	Partial Differential Equations I	3
Combinatorics		
MATH 736	Enumerative Combinatorics	3
MATH 737	Algebraic Combinatorics	3
Geometry/Topology		
MATH 746	Topology I	3
MATH 747	Topology II	3
Graduate Seminar		**3**
MATH 790	Graduate Seminar	
Doctoral Research		**6**
MATH 899	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 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 doctoral degree
- 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.
- A grade of Ph.D. Pass in four written preliminary examinations offered by the department.
- A passing grade in a preliminary oral examination administered by the student's supervisory committee after completion of the Preliminary Examinations.
- 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.

Timelines

Ph.D. students have through the January Preliminary Exams during their third year in the program to demonstrate proficiency in basic areas of mathematics by passing the written Preliminary Examinations. In the Spring semester of the third year the department committee will meet to discuss any candidates who have not completed their written preliminary examinations and make one of three recommendations:

1. If the students have earned a master's pass on two exams, then they will be granted an additional year in the program to complete a Master's degree. Whether they are able to complete the Master's degree or not they will be removed from the program after the additional year.
2. If the committee determines that the student is not making adequate progress, the student's funding (if any) will terminate at the end of the academic year, and they will have one year to complete a Master's degree. Whether they are able to complete the Master's degree or not they will be removed from the program after the additional year.
3. If the committee determines that an extension of the timeline is appropriate, then written notice will be given outlining what the student must accomplish by a specified date to continue receiving funding and/or remain in the program

Azer Akhmedov, Ph.D.
Yale University, 2004
Research Interests: Group Theory, Low Dimensional Topology

Maria Angeles Alfonseca, Ph.D.
Universidad Autonoma de Madrid, Spain, 2003
Research Interests: Fourier Analysis, Partial Differential Equations

Nikita Barabanov, Ph.D.
University of Kiev, 1979
Research Interests: Differential Equations, Control Theory, Optimization, Neural Networks

Jason Boynton, Ph.D.
Florida Atlantic University, 2006
Research Interests: Algebra

Catalin Ciuperca, Ph.D.
University of Kansas, 2001
Research Interests: Commutative Algebras, Algebraic Geometry

Dogan Comez, Ph.D.
University of Toronto, 1983
Research Interest: Ergodic Theory, Measureable Dynamics, Operator Theory

Josef Dorfmeister, Ph.D.
University of Minnesota, 2009
Research Interests: Symplectic Topology

Torin Greenwood, Ph.D.
University of Pennsylvania, 2015
Research Interests: Combinatorics

Friedrich Littmann, Ph.D.
University of Illinois, Urbana-Champaign, 2003
Research Interests: Approximation Theory, Analytic Number Theory

Artem Novozhilov, Ph.D.
Moscow State University of Communication Means, 2002
Research Interests: Mathematical Biology

Tim Ryan, Ph.D.
University of Illinois at Chicago, 2016
Research Interests: Algebraic Geometry

Janet Page, Ph.D.
University of Illinois at Chicago, 2018
Research Interests: Commutative Algebra and Algebraic Geometry

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

MBA-Agribusiness

Department Information

- **Program Director:**
  Derek Lehmberg, Ph.D.
- **Program Adviser:**
  Elizabeth Worth, M.Ed.
- **Email:**
  elizabeth.worth@ndsu.edu
- **Agribusiness Liaison:**
  Edie Nelson
- **Email:**
  edie.nelson@ndsu.edu
- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  (701) 231-6038
- **Department Web Site:**
  www.ndsu.edu/business/agmba/ (http://www.ndsu.edu/business/agmba/)
- **Application Deadline:**
  Applications are reviewed on a rolling admission basis for the intended or next available term.
- **Credential Offered:**
  M.B.A.
- **Test Requirement:**
  GMAT or GRE**
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

The Master of Business Administration (MBA) in Agribusiness program at North Dakota State University is a non-thesis, professional program designed to meet the educational needs of current and future agribusiness leaders. The program carves a niche at the intersection of business and agriculture, drawing on the resources and expertise of both the College of Business and the Department of Agribusiness and Applied Economics. It accommodates full- and part-time students, including working professionals, and focuses on preparing managers of agribusiness firms to make decisions that consider factors unique to agribusiness. Examples may include:

- production volatility caused by weather, pests, and biology
- logistics disruptions
- seasonality in production and consumption
- long investment and production cycles
- linkages with the government, financial institutions, and other organizations

In addition to these industry-specific topics, the program also provides a solid background in business, emphasizing the practicalities of managing agribusiness organizations. Graduates of the program can expect to gain high quality general business management skills along with in-depth knowledge of agribusiness and agricultural industries.

Financial Assistance

The College of Business and the Department of Agribusiness and Applied Economics offer financial assistance through a limited number of graduate assistantships and scholarships. Assistantships include a stipend and graduate base-tuition waiver in return for work within the college. The tuition waiver is limited to eligible graduate course work. Awards are competitive and administered on a case-by-case basis.

GMAT/GRE**

Individuals seeking admission to the MBA in Agribusiness program may request a waiver of the GMAT/GRE requirement if they meet one of the following requirements:

- The applicant has a cumulative post-secondary GPA of 3.5 or higher (on a 4.0 scale) from an accredited or otherwise recognized institution of higher education.
- The application has successfully completed two or more post-secondary degrees (bachelor's level or higher).
- The applicant holds a terminal degree (e.g., PhD, EdD, MD, JD, etc.).
- The applicant has substantial post-baccalaureate professional work experience (typically a minimum of five (5) years), including demonstrated leadership ability.

Appropriate documentation (i.e. official transcript(s), resume) is required to be uploaded to the application file. It does not, however, guarantee a waiver. Applicants requesting an exam waiver are reviewed on a case-by-case basis, and waiver approval is determined at the discretion of the MBA program coordinator and/or director.

The program will consist of 26-27 credits of core courses, with two elective courses (4-6 credits) for a total of 30-33 total credits.

Code	Title	Credits
Core Courses		**26-27**
AGEC 711	Applied Risk Analysis I	
AGEC 744	Agribusiness I: Agricultural Product Marketing and Agribusiness Strategy	
AGEC 797S	Comprehensive Project (Comprehensive Project/Agribusiness Strategy (capstone; integrate learning from previous courses; write a paper/case))	
AGEC 790	Graduate Seminar	
MBA 701	Strategic Cost Management	
MBA 702	Advanced Financial Management	
MBA 703	Advanced Organizational Behavior	
MBA 704	Supply Chain and Operations Management	
MBA 705	Strategic Marketing Management	
MBA 706	Managing Information Resources	
MBA 707	Microeconomics for Managers	
or AGEC 741	Advanced Microeconomics	
MBA 708	Advanced Strategic Management	
Choose at least two courses from the approved elective list.		**4-6**
Finance/Risk		
AGEC 646	Agribusiness Finance	
AGEC 712	Applied Risk Analysis II	
FIN 640	International Finance	
Logistics/Supply Chain Management		
TL 711	Integrated Supply Chain System	
TL 721	Global Supply Chain Management	
TL 723		
TL 731	Supply Chain Decision Analysis	
TL 829		
Marketing		
AGEC 644	Advanced Commodity Trading	
MRKT 634	Sales Management	
MBA 721	Creating and Marketing Innovations	
MBA 722	Marketing Analytics and Customer Intelligence	
MBA 723	Digital Marketing	
MBA 724	Integrated Marketing Communications	
Quantitative Methods		
AGEC 739	Analytical Methods for Applied Economics	
ECON 610	Econometrics	
ECON 710	Advanced Econometrics	
MBA 751	Business Analytics Concepts	
MBA 752	Business Analytics Strategy	
MBA 753	Business Analytics Methods	
Other Electives, including those listed above and:		

AGEC 652	Food Laws & Regulations
AGEC 674	Cooperatives
AGEC 720	Food Safety Costs and Benefits Analysis
AGEC 725	Food Policy
AGEC 793	Individual Study/Tutorial
ECON 640	Game Theory and Strategy
ECON 672	International Trade
MBA 731	Leading and Managing Teams
MBA 732	Managerial Leadership: Essential Competencies
MBA 733	Management Decision Making
MBA 734	Negotiations
MBA 736	Managing Conflict in Organizations
600- or 700-level College of Business, or related area courses approved by the MBA program director.	
Total Credits	**30-33**

Somnath Banerjee, Ph.D.
University of Central Florida, 2015
Field: Marketing

David W. Bullock, Ph.D.
Iowa State University, 1989
Field: Agricultural Economics

Linlin Chai, Ph.D.
Iowa State University, 2016
Field: Marketing

Rajani Ganesh-Pillai, Ph.D.
University of Central Florida, 2009
Field: Marketing

Robert Hearne, Ph.D.
University of Minnesota, 1995
Field: Agricultural and Applied Economics

Jeremy Jackson, Ph.D.
Washington University in St. Louis, 2008
Field: Economics

Joseph M. Jones, Ph.D.
University of Missouri-Columbia, 1991
Field: Marketing

Derek Lehmberg, Ph.D.
University of Western Ontario, 2010
Field: Strategic Management

Siew Lim, Ph.D.
University of Georgia, 2005
Field: Economics

Joshua Marineau, Ph.D.
University of Kentucky, Lexington, 2012
Field: Organizational Behavior

Frayne Olson, Ph.D.
University of Missouri, 2007
Agricultural Economics

Supavich Pengnate, Ph.D.
Oklahoma State University, 2013
Field: Management Information Systems

Tim O. Peterson, Ph.D.
Texas A&M University at College Station, 1988
Field: Management/Organizational Behavior

Xudong Rao, Ph.D.
University of Minnesota, 2015
Field: Applied Economics

Frederick Riggins, Ph.D.
Carnegie Mellon University, 1994
Field: Management Information Systems

Saleem Shaik, Ph.D.
University of Nebraska, Lincoln, 1998
Field: Agricultural Economics

Tom Wahl, Ph.D.
Iowa State University, 1989
Field: Agricultural Economics

William W. Wilson, Ph.D., *Distinguished Professor*
University of Manitoba, 1980
Field: Agricultural Economics

Lei Zhang, Ph.D.
University of Texas at Dallas, 2011
Field: Economics

Limin Zhang, Ph.D.
University of Arizona, 2005
Field: Management Information Systems

Emeritus

Bahman Bahrami, Ph.D.
University of Nebraska-Lincoln, 1983
Field: Managerial Economics, Management Information Systems, Labor Relations and Negotiation

C. Frederick Eisele, Ph.D.
University of Iowa, 1971
Field: Labor Management and Negotiation

Karen Froelich, Ph.D.
University of Minnesota, 1994
Field: Strategic Management

Terry W. Knoepfle, J.D., CPA
University of North Dakota, 1981
Field: Business Law and Tax Accounting

Mechanical Engineering

Department Information

- **Department Chair:**
  Alan Kallmeyer, Ph.D.
- **Graduate Coordinator:**
  Yechun Wang, Ph.D.
- **Department Location:**
  111 Dolve Hall
- **Department Phone:**
  (701) 231-8671
- **Department Email:**
  ndsu.me.gradprogram@ndsu.edu

- **Department Web Site:**
  www.ndsu.edu/me/ (http://www.ndsu.edu/me/)
- **Application Deadline:**
  February 15 for fall semester; September 15 for spring semester. Applications received after the deadline will still be considered, but preference is given to those submitted by the deadline.
- **Credential Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE required for applicants who have not earned a degree in the U.S. or international applicants who have not earned a degree from an ABET-accredited university.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

The Department of Mechanical Engineering offers graduate programs leading to the Master of Engineering (M.ENGR), Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees. Graduate work may be concentrated in a variety of areas including engineering mechanics, fatigue and fracture, biomechanics and biomaterials, thermal systems, fluid mechanics, energy, controls and mechatronics, or engineering materials with an emphasis on plastics, composite materials, and nanomaterials.

Graduates from a regionally accredited institution in the United States (or equivalent) with a baccalaureate degree in Mechanical Engineering or a closely related field are welcome to apply to the graduate program.

Admission consideration is primarily dependent upon:

- Undergraduate GPA and other activities;
- Graduate Record Examination (GRE) scores (international students);
- Duolingo, TOEFL, or IELTS scores (international students); and
- Area of interest.

To be admitted full standing, applicants must have a cumulative GPA of 3.0 (on a 4-point scale). International students must provide both GRE general test scores and language test scores such as Duolingo, TOEFL, or IELTS. Minimum requirement for admission consideration are 100 for Duolingo, 71 for TOEFL ibT, or 6.0 for IELTS score, and a 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 based on scholarship, potential to undertake advanced study and research, and financial need. The availability of research and teaching assistantships is contingent upon current funding levels.

In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

Mechanical Engineering - M.Engr

The Master of Engineering (M.Engr.) degree in Mechanical Engineering (ME) is a coursework-only master's degree targeted towards working professionals; i.e., those with baccalaureate degrees in mechanical engineering or related disciplines who are working full-time in industry.

To earn the degree, students will be required to complete 30 credits of coursework at the 600 or 700 level, but will not be required to complete a research-based thesis or comprehensive project-based paper. Students pursuing this degree option will be able to enroll in the same courses currently offered by the ME Department for students enrolled in the M.S. options.

Students enrolled in the M.Engr. program will not be eligible to receive a Teaching or Research Assistantship (TA/RA) from the department, nor will they be eligible for a tuition waiver.

Mechanical Engineering - M.S.

The minimum credits required for the M.S. degree in Mechanical Engineering is 30. The M.S. degree can be earned with either of two options: the thesis option or the comprehensive study option.

With the thesis option, a student must complete 21-24 credits of graduate courses in mechanical engineering and a master's thesis of 6 to 9 credits of ME 798 Master's Thesis. At the conclusion of the graduate program, the student will be examined orally on the thesis and course work.

With the comprehensive study option, a student must complete 27 credits of graduate courses in mechanical engineering and a master's paper of no more than 3 credits of ME 797 Master's Paper. At the conclusion of the graduate program, the student must pass a comprehensive oral examination on the master's paper and course work.

For more detailed information on the requirements for the M.S. degree, contact the department.

Mechanical Engineering - Ph.D.

The Ph.D. program requires the completion of 90 credit hours of graduate study beyond the baccalaureate degree (60 credits beyond the M.S. degree). In addition to the credit requirements for the M.S. degree, the Ph.D. degree requires a minimum of 24 course credits and a minimum of 24 credits of research-based dissertation. The remaining 12 credits may consist of any approved graduate level credits.

Code	Title	Credits
Didactic Courses		**24**
Courses numbered 601-689 or 700-989		
Dissertation Research		**24**
ME 899	Doctoral Dissertation	
Any approved graduate level credits		12
Total Credits		**60**

After the majority of course work has been completed, each student is required to pass a series of written qualifying exams on core subjects. After passing the written exams, an oral preliminary exam will be administered focusing on the student's proposal for the dissertation research. At the conclusion of the Ph.D. program, each student is required to pass a comprehensive oral final examination primarily focused on the dissertation. This exam may also cover material from course work, particularly courses fundamental to the dissertation. For more detailed information on the requirements for the Ph.D. degree, contact the department.

Graduate Seminar Series

In addition to the 30 credits of Master's coursework and/or 90 credits of Ph.D. coursework, students are required to enroll in the department's graduate seminar series, ME 790, for each semester of their graduate study but not to exceed three semesters, per degree. ME 790 is offered as a one (1) credit, required course and grades will be given only as pass/fail. The Master of Engineering degree is exempt from this requirement.

Fardad Azarmi, Ph.D.
University of Toronto, 2008
Research Interests: Thermal Spray Coatings, Thin Film, Multiscale Engineering Analysis, Finite Element Analysis, Failure in Materials, Corrosion, Materials Characterization, High Temperature Materials, Composite Structures, Metal Foams, Functionally Graded Materials

Jordi Estevadeordal, Ph.D.
University of Houston, 1996
Research Interests: Advanced Laser Techniques, Thermo-Fluid and Spray Diagnostics, 3D particle Image Velocimetry, Phosphorescence, Infrared Thermography, Filtered Rayleigh Scattering, Bio-Fluid Measurements

Adam Gladen, Ph.D.
University of Minnesota, 2014
Research Interests: Renewable Energy, Solar Thermal Energy, Energy Storage - in particular Thermochemical Energy Storage, Thermodynamics, Solar Thermochemistry, Heat transfer, Radiative Transfer in Participating Media, Solar Reactor Design

Inbae Jeong, Ph.D.
Korea Advanced Institute of Science and Technology, 2017
Research Interests: Robotics and Artificial Intelligence

Long Jiang, Ph.D.
Sichuan University, 2003
Research Interests: Nanoscale Materials Synthesis and Applications, Materials from Renewable Resources, Nanocomposites, Carbonaceous Materials, Polymeric Materials Processing and Functionalization

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

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

Prakash Selvakumar, Ph.D.
Nagoya University, Japan, 2012
Biomaterials, Regenerative Medicine, Tissue-Engineered Vascular Grafts, Microvasculature, Decellularized Extracellular Matrix, Bioceramics, Cancer and Vascular Biology.

Yildirim Bora Suzen, Ph.D.
Wichita State University, 1998
Research Interests: Computational Fluid Dynamics, Aerodynamics, Modeling of Industrial Transport Processes, Transition and Turbulence Modeling, Active/Adaptive Flow Control, Turbo machinery, Multiprocessor CFD

Annie X.W. Tangpong, Ph.D.
Carnegie Mellon University, 2006
Research Interests: Vibrations and Dynamics, Tribology, Friction Damping in Rotating Structures, Friction Damping in Nano- and Bio-materials

Chad A. Ulven, Ph.D.
University of Alabama at Birmingham, 2005
Research Interests: Advanced Composites Materials Development, Environmentally Friendly Materials Processing, Nondestructive Evaluation, Impact/High Strain Rate Characterization of Advanced Materials

Jessica L. Vold, Ph.D
North Dakota State University, 2012
Research Interests: Additive Manufacturing Materials, Polymer Matrix Composites, Torrefaction of Lignocellulosic Materials, Bio-Based Composite Materials, Mechanical Testing, Material Characterization

Xinnan Wang, Ph.D.
University of South Carolina, 2008
Research Interests: Experimental Biomechanics, Synthesis of Nanomaterials, Nanomechanical Characterization, Nanomanipulation

Yechun Wang, Ph.D.
University of Maryland, 2007
Research Interests: Microfluidics, Biofluid Mechanics, Computational Fluid Dynamics, Numerical Analysis, and Characterization of Organic Coatings

Xiangfa Wu, Ph.D.
University of Nebraska-Lincoln, 2003
Beijing Institute of Technology, 1998
Research Interests: Nanofabrication and Nanomaterials, Advanced Composites, Fracture and Impact Mechanics

Yan Zhang, Ph.D.
Iowa State University, 2013
Research Interests: Experimental Fluid Dynamics, Advanced Flow Diagnostic Techniques, Wind Engineering and Wind Hazard Mitigation, Bio-Fluid Mechanics and Cariovascular Hemodynamics Modeling

Microbiology

Department Information

- **Department Head:**
  John McEvoy, Ph.D.
- **Graduate Coordinator:**
  Danielle Condry, Ph.D.
- **Department Location:**
  Van Es Hall
- **Department Phone:**
  (701) 231-7512
- **Department Web Site:**
  www.ndsu.edu/microbiology/ (http://www.ndsu.edu/microbiology/)

- **Application Deadline:**
  January 15 for fall
- **Credential Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 81 (Speaking 23, Writing 21); IELTS 7 (Speaking 6, Writing 6); Duolingo 115

The Department of Microbiological Sciences offers graduate study leading to Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in Microbiology. Faculty in the department have expertise in microbiomes, microbial genomics, biotechnology, synthetic biology, molecular biology, virology, immunology, microbial physiology, and discipline-based education research. The M.S. in Microbiology emphasizes research methodology and laboratory techniques. The Ph.D. in Microbiology is an outcomes-based program focused on developing research project leaders.

M.S. in Microbiology

The master's program in Microbiology emphasizes research methodology and laboratory techniques. Student research and academic programs support a strong foundation of knowledge in microbiology and are individually tailored to meet the needs and interests of each student. Graduates are prepared for positions in research or commercial laboratories or for further graduate study. Students select a major adviser by the end of the first semester in residence. By the end of the first year in residence, the student and major adviser will select a supervisory committee. Students can earn a M.S. in Microbiology by completing a research thesis under the advisement of a research faculty member or by completing a comprehensive research paper in the program.

Graduating master's students will be able to:

1. Adhere to ethical and professional standards in Microbiology.

2. Demonstrate foundational knowledge in Microbiology, including proficiency in a range of techniques.

3. Participates in scholarly inquiry relevant the field of study.

4. Collect and document reproducible and publishable quality data through completion of experiments using at least one technique.

5. Critically analyze, write high-quality technical documents, and communicate scientific content to a chosen audience. Contribute significantly (co-authorship) to scientific journal articles.

6. Participates in collaboration in ways that enhance the output of the project.

7. Display professional skills in personal effectiveness, including managing individual projects and being ready for the workplace.

8. Participate in activities that promote civic responsibility, citizenship, and inclusiveness.

Ph.D. in Microbiology

The Ph.D. program in Microbiology encompasses many sub-disciplines, including plant-microbe and animal-microbe interactions, microbiome research, virology, vaccine development, soil microbiology, biofilm research, immunology, and discipline-based education research. The program trains students in the foundation of knowledge, process of inquiry, and philosophy of microbiology. It breaks with traditional programs by focusing training on seven well-defined learning outcomes that can be attained with or without supporting coursework. This includes outcomes for professional, ethical, and civic development Doctoral graduates are prepared for a variety of career paths including academic or industry research and academic teaching.

Graduating doctoral students will be able to:

1. Demonstrate professional and ethical behavior consistent with the expectations of the discipline.

2. Use and apply appropriate discipline knowledge, concepts, and theoretical frameworks.

3. Conduct scholarly inquiry relevant to societal challenges and the field of study.

4. Demonstrate proficiency with a variety of classical and modern techniques by collecting and documenting reproducible and publish quality data through completion of experiments.

5. Critically analyze, write high-quality technical documents, and communicate scientific content and research results to diverse audiences. Contribute significantly (first-authorship) to scientific journal articles.

6. Initiate and manage collaboration in ways that enhance the output of the project.

7. Display professional skills in personal effectiveness to be competitive in the job market.

8. Engage and initiate activities that display civic responsibility, citizenship and inclusiveness.

The program of study is customizable to each student's training needs. In the absence of didactic course requirements, the program holds students accountable for year-over-year progress toward the learning goals via annual assessments of student progress by the mentor and research advisory committee.

In addition to the Graduate School requirements (https://bulletin.ndsu.edu/graduate/admission-information/), applicants must have evidence of a strong academic record in the biological sciences.

The statement of purpose should address each of the following:

1. The degree you are seeking (Comprehensive study-based M.S., Thesis-based M.S., or PhD).
2. An explanation of how obtaining a graduate degree in our program fits your career goals.
3. A description of the qualities you possess that will contribute to your success.
4. A description of any relevant experiences you have had. If you have had research experience, it is important to include a letter of recommendation from your research adviser. (Particularly important for Thesis-based M.S. and Ph.D. applicants)
5. A list of the areas of research in the department that interest you and identifying specific researchers is helpful. (Particularly important for Thesis-based M.S. and Ph.D. applicants)
6. The Department of Microbiological Sciences and North Dakota State University value and support individuals with diverse backgrounds, and experiences. Valuing our differences opens learning opportunities beyond the traditional classroom, resulting in a more rewarding education, research, and enhanced perspectives. Please write a statement that identifies the distinctive characteristics and/or life experiences, such as successfully overcoming obstacles or hardships, that you would bring to your graduate studies.

Note to Reference Letter Writers

Please indicate how you know and how well you know the applicant. Be specific about the applicant's relevant academic skills, research skills, and personal traits, using illustrative examples whenever possible. Please put into perspective how the applicant compares to other students you have interacted with.

Admission Standards

Applicants are evaluated in each of five dimensions that are expected to impact performance as a graduate student:

1. Academic preparation
   a. Prior courses/degrees
   b. Communication
   c. English Proficiency - if applicable
2. Scholarly Potential
   a. Motivation for graduate study
   b. Prior Experience
3. Socio-Emotional Competencies
   a. Self-Appraisal
   b. Long term Goals/Accomplishments
4. Alignment with Program
   a. Alignment with Faculty research
   b. Alignment with program training
5. Alignment with Diversity Values of the department

Admission Process

The two admission pathways to our graduate programs – sponsored admission and general admission – differ primarily in the timing of mentor selection relative to graduate program admission. For sponsored admission, a mentor is identified before application for admission to one of our graduate programs. For general admission, mentor selection occurs after admission and completion of rotations. Please see the Microbiology website (https://www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences/) for more details on the process and Frequently Asked Questions.

Financial Assistance

Students must first apply to the Graduate College and be accepted to one of our programs before they are eligible to receive an assistantship. Research assistantships are available to students enrolled in the thesis-based M.S. and Ph.D. programs. Teaching assistantships are available to students enrolled in thesis-based M.S., and Ph.D. programs. Research and teaching assistantships are limited, contingent upon the availability of funds, and awarded competitively.

In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

Please refer to the department website for more information on the requirements for this program.

M.S. in Microbiology

The master's program requires completing a minimum of 30 semester credits with an overall GPA of 3.0 or better. Students are required to select from a list of core courses for eight to nine didactic credits toward their degree, as well as enroll in 1 credit of the following: Intro to Graduate Research, Scientific Integrity, and Journal Club (first year) and Seminar and Annual Review (second year).

Plan A Thesis-based M.S.: Of the 30 credits, 16 credits must be in didactic graduate courses. Thesis-based master's students can apply 6 to 10 credits MICR 798 Master's Thesis research towards the degree. This degree in microbiology requires a research-based thesis, a public seminar of the thesis research, and a final oral defense of the thesis.
Plan B Comprehensive Paper-based M.S.: Of the 30 credits, 21 credits must be in didactic graduate courses. Plan B (Paper-based) M.S. students can apply 2 to 4 MICR 797 Master's Paper based research credits towards the degree. This degree in microbiology requires the writing and presentation of a thoroughly researched paper to the student's committee.

Students with inadequate undergraduate training in microbiology will be required to complete undergraduate courses in microbiology in addition to the required minimum 30 semester credits.

Examinations

Thesis-based Examination: The final examination will be an oral defense of the student's research results. The student's research supervisory (thesis) committee will administer the exam after a public presentation of the work.

Comprehensive Paper-based Examination: M.S. students in this option will produce an in-depth research paper on a specific topic in Microbiology and present a summary of their paper. The paper will be reviewed by the student's supervisory committee and approved when completed.

Ph.D. in Microbiology

The Ph.D. program is based on defined training outcomes. Degree requirements are in agreement with NDSU Graduate School requirements. The student and major adviser will prepare a plan of study by the end of the first year in residence. The Graduate School requires the plan of study for the Ph.D. degree to include no less than 90 semester graduate credits (60 credits for students matriculating with a master's degree). An overall GPA of 3.0 or higher must be maintained. An annual review of the student's progress is required. Students must complete the following: Intro to Graduate Research, Scientific Integrity, and Journal Club in the first year and Journal Club, Seminar, and Annual Review in all subsequent years of the program.

Examinations

Qualifying Exam: The first exam in the PhD Program examines fundamental areas of knowledge in microbiology that will be essential for success as a doctoral candidate. Successful completion of the qualifying exam allows the student to move on to the preliminary exam. This exam can be completed in years 1 or 2 of the program.

Preliminary Exam: The second exam requires the student to write a research proposal in alignment with a program administered by NIH, NSF, or NIFA and defend the proposal in an oral examination. After successfully completing the written and oral preliminary examination, the student will be formally admitted to candidacy for the Doctor of Philosophy Degree. This exam is typically completed in years 2-3 of the program.

Final Exam: The final examination will be an oral defense of the student's research results. The student's research supervisory committee will administer the exam after a public presentation of the work.

Samat Amat, Ph.D **(**https://www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences/research/amat-lab/**).**
University of Calgary, 2019
Research Interests: Leveraging Livestock Microbiomes to Improve Nutrition and Animal Health and Reduce Antimicrobial Resistance.

Samiran Banerjee, Ph.D. **(**https://www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences/research/banerjee-lab/**)**
University of Saskatchewan, 2012
Research Interests: Soil and Plant Microbiome, Agricultural Intensification, Climate Change

Danielle Condry, Ph.D.
University of North Dakota, 2013
Research Interests: Discipline-Based Education Research; Equitable Grading Strategies in Large Enrollment Classes, Utilizing Concept Inventories to Inform Curricula Change, How Science Communication Impacts Decision-Making, and Community Engaged Learning and Its Impacts on Student Success in the Classroom

Glenn Dorsam, Ph.D.
Virginia Commonwealth University, 1998

Research Interests: Signaling by the Gut Hormone Vasoactive Intestinal Peptide and Its Role in Gut Microbiome Development, Abnormal Inflammation, and Fat Deposition

Barney Geddes, Ph.D.
University of Manitoba, 2014
Research Interests: Using Molecular Genetics, Functional Genomics, and Synthetic Biology Approaches to Understand Mechanisms of Beneficial Plant- Microbe Interactions

John McEvoy, Ph.D.
Ulster University, 2002
Research Interests: *Cryptosporidium* Ecology, Evolution and Host-Parasite Interactions; Environmental Microbiology

Birgit Pruess, Ph.D. **(**https://www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences/research/pruess-lab/**)**
Ruhr-Universitat Bochum, 1991
Research Interests: Global Gene Regulation in Enteric Bacteria; Complex Regulatory Networks

Sheela Ramamoorthy, Ph.D.
Virginia Polytechnic Institute and State University, 2006
Research Interests: Virology and Vaccinology

Music

Department Information

- **Department Chair:**
  E. John Miller, Ph.D.
- **Graduate Music Coordinator:**
  Charlette Moe, D.M.A.
- **Department Location:**
  115 Music Education Building
- **Department Phone:**
  (701) 231-7932
- **Department Web Site:**
  www.ndsu.edu/performingarts/music/ (http://www.ndsu.edu/performingarts/music/)
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Credential Offered:**
  D.M.A., M.M.
- **English Proficiency Requirements:**
  TOEFL iBT 79, IELTS 6.5, Duolingo 105

Graduate Degrees

The Master of Music and the Doctor of Musical Arts are offered with tracks in performance, conducting and music education.

Master of Music Degree (M.M.)

Three tracks are offered: Performance, Conducting, Music Theory Pedagogy and Music Education. The Performance, Music Theory Pedagogy, Choral Conducting and Instrumental Conducting tracks require a minimum of 30 credits; the Music Education track requires a minimum of 30 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 primary purposes of the MM option in Music Theory Pedagogy are (1) to add to the breadth of the experiences for our graduate students and (2) to make them more attractive candidates in their job searches, especially those seeking teaching positions in higher education. The M.M. in Music Education is designed for music teachers who wish to update and increase their practical pedagogical knowledge.

Applications may be completed online at www.ndsu.edu/gradschool. (http://www.ndsu.edu/gradschool/) A complete application will include three recommendations, transcripts and a scholarly writing example. Applicants should notify the graduate music coordinator, charlette.moe@ndsu.edu, (jo.miller@ndsu.edu) of their intention to apply. For applicants in performance and conducting, an on-campus visit and audition are required. Following acceptance into the masters program, applicants will complete a diagnostic exam, which will be used by their advisers to plan appropriate coursework.

All coursework must be passed with a minimum grade of B. Comprehensive written examinations in the student's primary area and in music academic studies must be passed near the end of or after coursework. The final oral examination (administered by the student's committee) occurs after the written comprehensive exam.

Conductors and performers will prepare a recital as their capstone experience. Those in the music education track will complete a written practicum. Both experiences will be planned with guidance by the candidate's committee. The committee will include three graduate faculty members: the adviser, a representative from music academic studies, and at least one other music faculty member.

Master of Music in Music Education Degree

This degree is designed to be completed in three summers or in a combination of summers and the academic year. Students must register for a least six credits per calendar year until all degree requirements are completed. Classes are offered both online and on campus. Course-work can be focused in elementary, choral/vocal, or instrumental music education. No thesis is required; rather, students will complete a four-credit practicum. The practicum will be agreed upon and planned jointly by the student and his/her adviser. Comprehensive written examinations must be passed near the end of or after coursework. The final oral examination (administered by the student's committee) occurs after the written comprehensive examination.

Doctor of Musical Arts (D.M.A.)

The D.M.A. is the terminal professional practical degree in music, designed for performers and conductors wishing to acquire the highest performance abilities. Graduates will have attained the academic qualifications generally accepted for teaching at the college level.

Entering students in the vocal performance track are expected to have appropriate language proficiencies in French, German, and Italian. Remedial work may be required upon recommendation of the adviser and committee.

Recitals and a final written project are planned in conjunction with the candidate's committee, which consists of at least four members: the adviser, a representative from the student's major area, a member from music history or music theory, and a Graduate School Representative (https://catalog.ndsu.edu/graduate/graduate-school-policies/doctoral-degree-policies/#planofstudysupervisorycommitteetext).

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. Students entering the program with an approved master's degree or its equivalent may apply credits toward the D.M.A. The graduate music faculty will determine the viability and number of transfer credits.

Additional information about graduate study at the Challey School of Music may be found at www.ndsu.edu/performingarts/music/graduate/.

Doctor of Musical Arts in Vocal Performance

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1,1,1,1,1,1,1)	
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 (1,1,1,1)	
Credits		**52**
History/Theory		**15**
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 634	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th & 21st Century Music History	
Pedagogy		**6**
MUSC 721	Advanced Vocal Pedagogy	
MUSC 794	Practicum	

Literature		**9**
MUSC 746	Topics in Song Literature (3,3,3)	
Electives (In consultation with adviser)		**8**
Total Credits		**90**

Doctor of Musical Arts in Instrumental Performance

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1,1,1,1,1,1,1)	
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 (1,1,1,1)	
Credits		**52**
History/Theory		**15**
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 634	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th & 21st Century Music History	
Pedagogy/Literature (Minimum six credits in each)		**12**
MUSC 722	Applied Instrumental Pedagogy	
MUSC 764	Applied Instrumental Literature	
Optional: Supplemental Literature		**2**
MUSC 641	Symphonic Literature	
MUSC 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
Electives (in consultation with adviser)		**9**
Total Credits		**90**

Doctoral of Musical Arts in Piano Performance

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1) *	
MUSC 731	Applied Study (4,4,4,4,4,4,4,4)	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital (4,4,4,4)	
MUSC 789	D.M.A. Thesis (1,1,1,1)	
Credits		**58**
History/Theory**		**15**
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 634	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th & 21st Century Music History	
Pedagogy/Literature		**6**
MUSC 643	Keyboard Literature	

MUSC 623	Piano Pedagogy	
MUSC 793	Individual Study/Tutorial (Individual Study in Keyboard Literature or Piano Pedagogy)	
Electives (in consultation with adviser)		**11**
Total Credits		**90**

* At least 3 credits of MUSC 790 must be earned while in residence at NDSU.
** At least one course must be taken from MUSC 611-734; at least one course must be taken from MUSC 740-744

Doctor of Musical Arts in Collaborative Piano

Code	Title	Credits
MUSC 731	Applied Study (4,4,4,4,4,4,4,4) At least 4 semesters of MUSC 731 must be taken in residence during the DMA program	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital (4,4,4,4)	
MUSC 789	D.M.A. Thesis (1,1,1,1)	
Credits		**54**
History/Theory *		**15**
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 634	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th & 21st Century Music History	
Piano Pedagogy; to be taken from:		**3**
MUSC 623	Piano Pedagogy	
MUSC 793	Individual Study/Tutorial (Individual Study in Piano Pedagogy)	
Vocal or Instrumental Specialization **		**10**
MUSC 642	Opera Literature	
MUSC 705	Graduate Diction Survey I	
MUSC 706	Graduate Diction Survey II	
MUSC 709	Graduate Ensemble	
MUSC 764	Applied Instrumental Literature	
MUSC 746	Topics in Song Literature	
Electives (in consultation with adviser)		**8**
Total Credits		**90**

Doctor of Musical Arts in Choral Conducting

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1,1,1,1)	
MUSC 731	Applied Study (4,4,4,4,4)	
MUSC 733	Choral Studies and Pedagogy (Up to 4 credits (2,2) may be substituted for MUSC 731)	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital (4,4,4)	
MUSC 789	D.M.A. Thesis (1,1,1,1)	
Credits		**44**
History/Theory		**15**
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 634	Analytical Techniques	

MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th & 21st Century Music History	
Literature		**12**
MUSC 760	Medieval/Renaissance Choral Literature	
MUSC 761	Baroque Choral Literature	
MUSC 762	Classical/Romantic Choral Literature	
MUSC 763	Contemporary Choral Literature	
Cognate Courses determined with advisor from Conducting, Music Education, Academic Studies and Performance		**15**
Electives (in consultation with adviser)		**4**
Total Credits		**90**

Doctor of Musical Arts in Instrumental Conducting

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1,1,1,1)	
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		**15**
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 634	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th & 21st Century Music History	
Literature		**6**
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		**15**
Electives (in consultation with adviser)		**10**
Total Credits		**90**

Master of Music in Music Theory Pedagogy

Course List

Music Theory Core

Code	Title	Credits
Required Core Courses		**16**
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 735	Music Theory Pedagogy I	
MUSC 736	Music Theory Pedagogy II	
MUSC 794	Practicum	
Choose one of the following:		**3**
MUSC 611	Form and Analysis	
MUSC 634	Analytical Techniques	
Music Core		

74x History (Choose based on availability in course rotation)		3
MUSC 748	Music Bibliography/Research Methods	2
Electives (in consultation with adviser)		6
Total Credits		**30**

Overview of Program:

The primary purposes of the MM option in Music Theory Pedagogy are (1) to add to the breadth of the experiences for our graduate students and (2) to make them more attractive candidates in their job searches, especially those seeking teaching positions in higher education. The current job market in higher education prioritizes depth of knowledge and experience in more than a single specialty area. Often, this means extensive knowledge and experience in music history and/or music theory. Further, the most successful applicants on the academic job market have not only experience teaching music theory or music history, but also a relevant academic credential. This new program would allow enrolled students to advance their knowledge of music theory and their marketability in teaching the undergraduate theory sequence.

This degree track is designed for students who wish to expand their professional marketability by preparing performers/conductors for the many university positions that involve both performance and classroom teaching. The MM in Music Theory Pedagogy option will primarily be pursued by students jointly with another MM option or DMA in Performance or Conducting, though it has enough unique required courses to be granted as a single degree.

Master of Music in Music Education Degree

Code	Title	Credits
Music Education Core		**9**
MUSC 701	Psychology Of Music	
MUSC 703	Foundations of Music Education	
MUSC 790	Graduate Seminar	
Music Core		**8**
MUSC 702	Graduate Theory Survey	
MUSC 704	Graduate Music History Survey	
MUSC 731	Applied Study	
Music Electives		**9**
MUSC 713	Advanced Choral Music Methods	
MUSC 714	Advanced Elementary Music Methods	
MUSC 715	History of Choral Literature	
MUSC 758	Jazz Methods and Pedagogy in Music Education	
MUSC 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
Capstone		
MUSC 794	Practicum	4
Total Credits		**30**

Master of Music in Instrumental Performance

Code	Title	Credits
Required Courses		**21-24**
MUSC 709	Graduate Ensemble (3 credits)	
MUSC 731	Applied Study (8 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 credits)	
MUSC 722	Applied Instrumental Pedagogy (2-3 credits)	
MUSC 764	Applied Instrumental Literature (1-3 credits)	
Optional: Choose from the following (in consultation with adviser)		**0-3**
MUSC 641	Symphonic Literature	
MUSC 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
Theory		**3**

MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 634	Analytical Techniques	
History		**3**
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th & 21st Century Music History	
Minimum Total Credits		30

Master of Music in Piano Performance

Code	Title	Credits
Required Courses		**16**
MUSC 709	Graduate Ensemble (1, 1)	
MUSC 731	Applied Study (At least 2 registrations; typically 2, 2, 2, 2)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (Either 4 or 2, 2)	
One course to be taken from each of the following areas:		**6**
Literature		
MUSC 643	Keyboard Literature	
Pedagogy		
MUSC 623	Piano Pedagogy	
An Individual Study in Keyboard Literature or Piano Pedagogy may alternately fulfill the requirement in either category		
MUSC 793	Individual Study/Tutorial (Individual Study in Keyboard Literature or Piano Pedagogy)	
Theory		**3**
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 634	Analytical Techniques	
History		**3**
MUSC 740	Medieval/Renaissance Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th & 21st Century Music History	
Electives (in consultation with advisor)		**2**
Minimum Total Credits		30

Master of Music in Collaborative Piano

Code	Title	Credits
Required Courses		**20**
MUSC 731	Applied Study (Collaborative and performance; 2-4 cr each registration)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 or 2, 2)	
Vocal or instrumental specialization, choose from:		**4**
MUSC 705	Graduate Diction Survey I	
MUSC 706	Graduate Diction Survey II	
MUSC 709	Graduate Ensemble	
MUSC 764	Applied Instrumental Literature	
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 634	Analytical Techniques	
History		**3**
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th & 21st Century Music History	
Total Credits		**30**

Master of Music in Vocal Performance

Code	Title	Credits
Required Courses		**20**
MUSC 709	Graduate Ensemble	
MUSC 721	Advanced Vocal Pedagogy	
MUSC 731	Applied Study	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital	
One course to be taken from each of the following areas:		
Theory		**3**
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 634	Analytical Techniques	
History		**3**
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th & 21st Century Music History	
Literature		**3**
MUSC 746	Topics in Song Literature	
Electives (in consultation with advisor)		**1**
Minimum Total Credits		**30**

Master of Music in Choral Conducting

Code	Title	Credits
Required Courses		**19**
MUSC 709	Graduate Ensemble	
MUSC 721	Advanced Vocal Pedagogy	
MUSC 731	Applied Study	
MUSC 733	Choral Studies and Pedagogy (Up to 2 credits may be substituted for MUSC 731)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 credits)	
Theory (One course)		**3**
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 634	Analytical Techniques	
History (One course)		**3**

MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th & 21st Century Music History	
Literature (Two courses)		**6**
MUSC 760	Medieval/Renaissance Choral Literature	
MUSC 761	Baroque Choral Literature	
MUSC 762	Classical/Romantic Choral Literature	
MUSC 763	Contemporary Choral Literature	
Minimum Total Credits		**31**

Master of Music in Instrumental Conducting

Code	Title	Credits
Required Courses		**18**
MUSC 709	Graduate Ensemble	
MUSC 731	Applied Study (Conducting)	
MUSC 731	Applied Study (Instrument)	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital	
Theory (One course)		**3**
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 634	Analytical Techniques	
History (One course)		**3**
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th & 21st Century Music History	
Literature		**6**
MUSC 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
Minimum Total Credits		30

Jeremy Brekke, D.A., Associate Professor

Kelly W. Burns, D.M.A., Assistant Professor

Connor Challey, M.M., Lecturer

Andrew Froelich, D.M.A., Professor Emeritus

Robert W. Groves, Ph.D., Professor Emeritus

Sigurd Johnson, D.M.A., Associate Professor

Robert J. Jones, D.M.A., Professor Emeritus

Cassie Keogh, D.M.A., Associate Professor

Kyle Mack, D.A., Associate Professor

Jo Ann Miller, D.M.A., Professor

John Miller, Ph.D., Professor

Charlette Moe, D.M.A., Associate Professor

Warren Olfert, Ph.D., Professor

Matthew Patnode, D.M.A., Professor

Virginia Sublett, D.M.A, Professor Emerita

Karisa Templeton, D.M., Assistant Professor

Michael Weber, D.M.A., Professor

Tyler Wottrich, D.M.A., Associate Professor

Natural Resource Sciences

Department Information

- **Program Director:**
  Shawn DeKeyser, Ph.D.
- **Email:**
  Edward.Dekeyser@ndsu.edu
- **Department Location:**
  School of Natural Resource Sciences, Hultz 202
- **Department Phone:**
  (701) 231-5368
- **Department Web Site:**
  www.ndsu.edu/snrs/ (http://www.ndsu.edu/snrs/)
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Credential Offered:**
  Ph.D., M.S., M.N.R.M.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

The Natural Resource Sciences (NRS) program prepares students for the environmental challenges of the 21st century. The Master of Natural Resources Management (M.N.R.M.), Master of Science (M.S.) and the Doctor of Philosophy (Ph.D.) degrees are interdisciplinary and offer a broad, systems- based approach toward managing natural resources. NRS graduates are prepared to compete for and be productive in jobs where issues reach beyond a single discipline or subject area. They have the skills necessary to address problems from a sustainable social-ecological perspective. Flexible interdisciplinary wide-reaching

The M.S. and Ph.D. programs four sub-plan options:

- Entomology
- Natural Resource Management
- Precision Agriculture
- Rangeland Ecology and Wildlife Management
- Soil Science

The M.N.R.M program is coursework only and can be done in-person or online. Through the NRS graduate program, students gain a breadth of knowledge in relevant planning, analysis, and management in a wide variety of natural resource fields from pollinators to pest management, cropping systems to soil health, wetlands to wildlife, and restoration to grazing management.

The NRS 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 Sciences is open to qualified graduates of universities and colleges of recognized standing and meet the Graduate College requirements.

Financial Assistance

Both research and teaching assistantships may be available through the participating academic units. Application for an assistantship must be made directly to a department. Applicants are considered based on scholarship and potential to undertake advanced study and research. Limited scholarships are available.

To qualify for the M.N.R.M. degree, the candidate must satisfactorily complete a minimum of 30 semester credits of course work in the selected curriculum. This can be done in person or online.

To qualify for the M.S. degree, the candidate must satisfactorily complete a minimum of 30 semester units in the 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 final examination on the dissertation. In addition, the candidate presents final public seminar based on the dissertation research. For more specific information, please refer to the School of Natural Resource Sciences website.

Courses are offered by the School of Natural Resource Sciences and 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
- Microbiology
- Philosophy
- Plant Pathology
- Plant Sciences
- Political Science
- Range Science
- Sociology
- Soil Science
- Statistics
- Zoology

Master of Science

Plan A - Master's Thesis Option

Code	Title	Credits
Precision Agriculture Sub-plan		
PAG 654	Applications of Precision Agriculture	3
ABEN 682	Instrumentation & Measurements	3
ABEN 790	Graduate Seminar	1 (minimum)
PAG 798		6 (minimum)
Electives (must be approved by advisor and include at least 10 didactic credits)		17 (minimum)

Total Credits	30
Natural Resource Management, Entomology, Rangeland Ecology and Wildlife Management, and Soil Science Sub-plans	
Electives (must be approved by advisor and include at least 10 didactic credits)	21
Master's Thesis (SOIL 798, RNG 798, ENT 798, or NRM 798)	9
Total Credits	30

Plan B - Master's Paper Option

Code	Title	Credits
Precision Agriculture Sub-plan		**30**
PAG 654	Applications of Precision Agriculture	3
GEOG 655	Introduction to Geographic Information Systems	3
Graduate Seminar (ABEN 790)		1 (minimum)
Electives (must be approved by advisor and include at least 10 didactic credits)		21
Master's Paper (PAG 797)		2 (minimum)
Natural Resource Management, Entomology, Rangeland Wildlife and Ecology Management, and Soil Science Sub-plans		**30**
Emphasis Area Courses (NRM, SOIL, ENT, or RNG)		5
Electives (must be approved by advisor and include at least 10 didactic credits)		21
Master's Paper (SOIL 797, RNG 797, ENT 797, or NRM 797)		4

Emphasis Areas:

- Entomology
- Soil Science
- Natural Resource Management
- Rangeland Ecology and Wildlife Management

Minimum credit requirements are listed below. Specific courses shall be decided by the students' advisor and committee.

Code	Title	Credits
Master's to Ph.D.		**60**
Didactic coursework (700-789, 791; 800-889, 891)		15
Additional Courses		
Doctoral Dissertation (899)		

Code	Title	Credits
Bachelor's to Ph.D.		**90**
Didactic coursework (601-689,691; 700-789, 791; 800-889, 891)		27
15 must be at the 700 or 800 level		
Additional Courses		
Doctoral Dissertation (899)		

Adnan Akyuz, Ph.D.
University of Missouri-Columbia, 1994
Research Area/Activity: Applied Climatology and Microclimatology/Climate Based Agricultural Management

Larry J. Cihacek, Ph.D.
Iowa State University, 1979
Research Area/Activity: Erosion and Productivity Relationships, Conventional and Alternative Crop Management, Carbon Sequestration, Nutrient Management

Dennis Cooley, Ph.D.
University of Rochester, 1995
Research Area/Activity: Ethics (Bioethics, Environmental, Agricultural, Business, Professional, and Theoretical)

Edward (Shawn) DeKeyser, Ph.D.

North Dakota State University, 2000
Research Area/Activity: Wetland Ecology, Wetland Assessment and Monitoring, Invasive Species Ecology and Management, Native Prairie and Wetland Restoration

Tom DeSutter, Ph.D.
Kansas State University, 2004
Research Area/Activity: Trace Elements, Land Application of Byproducts, Inorganic Soil Chemistry, Soil Environmental Condition

Paulo Flores, Ph.D.
Federal University of Rio Grande do Sul, Brazil
Research Area/Activity: Precision Agriculture, Applications of UASs/Drones in Agriculture, UASs/Drone Imagery Analysis, GIS Applications for Precision Agriculture

Caley Gasch, Ph.D.
University of Wyoming, 2013
Research Area/Activity: Soil Ecology, Restoration, Reclamation, Monitoring of Degraded Soils

Benjamin Geaumont, Ph.D.
North Dakota State University, 2009
Research Area/Activity: Evaluation of Upland Bird Survival Habitat Use, Upland Game Species

Kelsey Griesheim, Ph.D.
University of Illinois - Urbana-Champaign, 2022
Research Area/Activity: Soil Fertility, Resource Management, Fertilizer Efficiency, Nitrogen Management

Christina Hargiss, Ph.D.
North Dakota State University, 2009
Research Area/Activity: Wetland Assessment, Water Quality, Water Use, and Urban Ecosystems

Robert Hearne, Ph.D.
University of Minnesota, 1995
Research Area/Activity: Water Resources Management Institutions, Water Markets, Protected Area Management, Economic Valuation of Environmental Goods and Services

Torre Hovick, Ph.D.
Oklahoma State University, 2014
Research Area/Activity: Global change, Avian Ecology, Fire Ecology, Rangeland Management

Xinhua Jia, Ph.D.
University of Arizona, 2004
Research Area/Activity: Soil and Water Engineering, Hydrology

Zhulu Lin, Ph.D.
University of Georgia, 2003
Research Area/Activity: Water and Soil Resources, Environmental Modeling

Lindsay Malone, Ph.D.
University of Wisconsin - Madison, 2022
Research Area/Activity: Climate Smart Approaches to Agriculture, Soil Management, Soil Health, Science Communication

Jack E. Norland, Ph.D.
North Dakota State University, 2008
Research Area/Activity: Restoration Ecology, Application of Remote Sensing to Natural Resources Management, Study of Natural Resources Management Problems in a Socio-Ecological Setting Including Urban Systems

Deirdre Prischmann-Voldseth, Ph.D.
Washington State University, 2005
Research Area/Activity: Integrated Pest Management, Biological Control, Insect Ecology

David A. Rider, Ph.D.
Louisiana State University, 1988
Research Area/Activity: Insect Systematics

David Ripplinger, Ph.D.
North Dakota State University, 2012

Research Area/Activity: Bioproducts / Bioenergy Economics

David Roberts, Ph.D.
Oklahoma State University, 2009
Research Area/Activity: Agricultural Production Methods, Precision Agriculture Technologies, Biofuels Policy

Travis Seaborn, Ph.D.
Washington State University, 2019
Research Area/Activity: Conservation Biology, Climate Change, Genetics, Social-Ecological Systems, Fish and Wildlife

Kevin Sedivec, Ph.D.
North Dakota State University, 1994
Research Area/Activity: Plant Community Ecology, Grazing and Wildlife Interaction, Reclamation of Energy Developed Lands, Range Nutrition, Range Monitoring

Dean D. Steele, Ph.D.
University of Minnesota, 1991
Research Area/Activity: Irrigation and Environmental Engineering

Joseph D. Zeleznik, Ph.D.
Michigan State University, 2001
Research Area/Activity: Dendrochronology of Ponderosa Pine and Bur Oak, Bur Oak Regeneration, Riparian Forest Restoration

New Institutional Social Science

Department Information

- **Department Location:**
  400 Barry Hall
- **Department Phone:**
  (701) 231-7790
- **Credential Offered:**
  Certificate

Overview

A New Institutional Social Science certificate expands the graduate student experience and opens up job opportunities by exposing students to diverse tools and ideas surrounding institutions and policies. Students will pursue research topics addressing society's grand challenges and learn how institutions guide our political, economic, and social interactions.

Eligibility

The certificate program is open to any student enrolled in an NDSU Graduate School program (masters or doctoral). The program has no additional admissions requirements.

To Apply

Students enrolled in the NDSU Graduate School can add the certificate to their degree program by completing and submitting this form (https://na3.docusign.net/Member/PowerFormSigning.aspx?PowerFormId=c1cb9cfb-01ab-4aed-8b40-d52decd10498&env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&v=2).

Students are responsible for filling out the top section of the form and providing contact information for members of their home department. The Certificate Program Coordinator for the NISS certificate is Jeremy Jackson, jeremy.jackson@ndsu.edu. If you have questions regarding the form, please contact Melissa Selders-Ortez at melissa.seldersortez@ndsu.edu.

Certificate Requirements

Code	Title	Credits
Required Courses		
NISS 701	Survey of New Institutional Social Science	1
NISS 710	Workshop in New Institutional Social Science	3
ECON 762	New Institutional Economics	3
POLS 762	New Institutionalism in Political Science	3

Elective Course		
PSYC 670	Experimental Social Psychology	3
or SOC 733	Organizations and the State	
Total Credits		**13**

Nursing

Department Information

- **Department Chair:**
  Carla Gross, RN, Ph.D.
- **Department Location:**
  Aldevron Tower 540
- **Department Phone:**
  (701) 231-5692
- **Department Web Site:**
  www.ndsu.edu/nursing/ (http://www.ndsu.edu/nursing/)
- **Application Deadline:**
  Doctor of Nursing Practice, January 31 for BSN to DNP fall admission. BSN to DNP requires a March interview.
- **Credential Offered:**
  D.N.P - FNP
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

The Doctor of Nursing Practice (DNP) degree, a clinical doctorate, is offered in the Family Nurse Practitioner specialty. The program includes advanced nursing courses, support courses, clinical practica and clinical disquisition.

Guidelines provided by the American Association of Colleges of Nursing (AACN) and the National Organization of Nurse Practitioner Faculties (NONPF) are utilized in the curriculum. The graduate nursing program is accredited by the Commission on Collegiate Nursing Education (CCNE).

1. Baccalaureate degree in nursing from a nationally accredited nursing program.
2. Undergraduate coursework in research and health assessment.
3. Current unencumbered RN licensure
4. Completed application to the Graduate School.
   a. Three references: two from professional colleagues that address clinical competence and potential for graduate education, and one other reference.
   b. Written narrative of professional experience and future goals.
5. Interviews required for applicants on either the first or second Friday and Saturday of March. Dates will be determined by the NDSU School of Nursing and will be posted on their website.

1. Family Nurse Practitioner/Doctor of Nursing Practice: A minimum of 86 (DNP) semester credits.
2. A maximum of nine graduate semester credits (with a grade of B or better) completed within seven years previous to admission, may be transferred from other regionally accredited colleges or universities with the consent of the student's supervisory committee.
3. Clinical Dissertation

Code	Title	Credits
Core Course Requirements		
NURS 802	Ethics and Health Policy in Nursing	
NURS 804	Nursing Research/Evidence Based Practice	
NURS 806	Health Care Delivery Systems and Financing	
NURS 808	Informatics in Advanced Nursing Practice	
Family Nurse Practitioner Requirements (DNP)		
NURS 810	Health Promotion and Disease Prevention	
NURS 812	Advanced Health Assessment	
NURS 812P	Assessment Practicum	
NURS 814	Advanced Pathophysiology Across the Lifespan I	
NURS 815	Population Health/Epidemiology for Advanced Practice Nursing	

NURS 816	Advanced Pathophysiology Across the Lifespan II	
NURS 820	Advanced Practice Roles	
NURS 828	An Introduction to Primary Care (Common Medical Conditions)	
NURS 830	Clinical Applications	
NURS 831	Advanced Pharmacology I	
NURS 832	Advanced Pharmacology II	
NURS 833	Family Primary Care I:Assessment and Management	
NURS 833P	Family Primary Care:Residency I	
NURS 834	Family Primary Care II:Assessment and Management	
NURS 834P	Family Primary Care:Residency II	
NURS 835	Family Primary Care III: Assessment and Management	
NURS 835P	Practicum IV: FNP Role Integration	
NURS 836P	Practicum V: FNP Role Integration	
NURS 850P	Family Primary Care: Specialty Practicum	
NURS 880	Interprofessional Collaborative Practice	
STAT 725	Applied Statistics	
NURS 899S	Clinical Dissertation	
Total Credits		**86**

Mykell Barnacle, DNP, FNP
North Dakota State University, 2008

Kerri L. Benning, DNP, FNP
American Sentinel University, 2022

Kelly Buettner-Schmidt, Ph.D., RN, FAAN
University of New Mexico, 2013

Carla Gross, Ph.D., RN
North Dakota State University, 2012

Dean Gross, Ph.D., FNP
Rush University, 1998

Carrie Nelson, DNP, FNP
North Dakota State University, 2018

Allison Peltier, DNP, FNP
North Dakota State University, 2015

Heidi Saarinen, DNP, FNP
North Dakota State University, 2010

Organizational Change Management

Department Information

- **Department Location:**
  Barry Hall
- **Department Phone:**
  (701) 231-6038
- **Department Email:**
  elizabeth.worth@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/business/programs/graduate/graduate_certificates/ (http://www.ndsu.edu/business/programs/graduate/graduate_certificates/)
- **Credential Offered:**
  Graduate Certificate

In today's turbulent business environment, organizations need employees who can effectively lead change to reconfigure their organizational structures and implement new processes and technologies. Learn how to formulate and lead effective change programs.

Code	Title	Credits
Required Courses		
MGMT 727	Organizational Change Management	3
MGMT 752	Organizational Restructuring	3
Electives (choose one)		
MGMT 630	Leadership in Organization	3
MBA 734	Negotiations	2
Total Credits		8-9

Pharmaceutical Sciences

Department Information

- **Department Chair:**
  Jagdish Singh, Ph.D.
- **Department Location:**
  136 Sudro Hall
- **Department Phone:**
  (701) 231-8902
- **Department Email:**
  ndsu.pscigradinfo@ndsu.edu
- **Department Web Site:**
  https://www.ndsu.edu/pharmacy/degrees_and_programs/graduate_program/
- **Application Deadline:**
  March 15 for fall semester and October 1 for spring semester, if positions are available.
- **Credential Offered:**
  Ph.D.
- **Test Requirement:**
  GRE (300 or more)
- **English Proficiency Requirements:**
  TOEFL ibT 90; IELTS 6.5; Duolingo 115

Program Description

The Department of Pharmaceutical Sciences offers graduate study leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees. 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 College requirements, the applicant must have adequate preparation in pharmacy or a biological or physical science related to pharmaceutical sciences.

Students interested in the Master of Science degree should contact the Department of Pharmaceutical Sciences for more information.

Financial Assistance

Graduate assistantships are available. To be considered for an assistantship, the student must have completed a Graduate College application, be accepted by the department, and submit a formal letter to the department chair requesting an assistantship.

Doctor of Philosophy

The Doctor of Philosophy program requires the completion of 90 credits, including 30 semester credits of letter-graded course work with a GPA of 3.0 or better. Of these 30 credits, at least 18 credits must be at 700 level. Candidates defend their dissertations. Candidates for the Ph.D. will be required to take an examination directed at determining competency in the pharmaceutical sciences.

The department requires the following core courses:

Code	Title	Credits
Core Courses		
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
PSCI 611	Principles of Pharmacokinetics and Pharmacodynamics	3
PSCI 670	Pharmacokinetics	3
STAT 725	Applied Statistics	3
Additional Credits		**7 (minimum)**
Courses numbered 700-789, 791		
Seminars		
PSCI 790	Graduate Seminar (one credit each semester)	
Research		**60**
PSCI 899	Doctoral Dissertation	
Total Credits		**90**

Master of Science

In consultation with the adviser and student's supervisory committee a Plan of Study would be developed. The Master of Science in Pharmaceutical Sciences program follows Graduate College degree requirements (https://bulletin.ndsu.edu/graduate/graduate-school-policies/masters-program-policies/).

Natasha Fillmore, Ph.D.
University of Alberta, 2016
Postdoctoral: National Heart, Lung, and Blood Institute 2016-2021
Research Interests: Understanding the Role of Energy Metabolism in Insulin Resistance, the Role of Fatty Acid Signaling in Regulating Cardiac Hypertrophy and Function

Roberto Gomes, Ph.D.
University of Sao Paulo, 2011
Postdoctoral: Harvard University 2017-2020, Federal University of Mato Grosso do Sul 2012-2013, and University of São Paulo 2011
Research Interests: Enantioselective Synthesis; Development of Novel Small Molecules, Nucleotides and Antibodies; Tumor-Targeting Strategy Using Enediones Engineered With Cytotoxic Moiety/Nir Probes; Development of New NIR Fluorescent Probe-Therapeutic Agent Conjugate Triggered by the Acid pH of the Environment of the Tumor Cell for the Early Diagnosis of Pancreatic Cancer and Molecular Drug Discovery of Proteolysis Targeting Chimeric (Protac) Based Prototype.

Ang Guo, Ph.D.
Shanghai Institute for Biological Sciences, Chinese Academy of Sciences, 2010
Postdoctoral: University of Iowa 2015
Research Assistant Professor 2019
Research Interests: Cardiovascular Pharmacology and Pathophysiology

Yagna Jarajapu, M.Pharm., Ph.D.
University of Strathclyde, 1998
Glasgow Caledonian University, 2002
Postdoctoral: University of Florida and Wake Forest University 2003-2008
Research Interests: ACE2/Angiotensin-(1-7) and Bone Marrow Progenitor Cells in Diabetes

Buddhadev Layek, Ph.D.
North Dakota State University, 2014
Postdoctoral: University of Minnesota 2017
Researcher 5, University of Minnesota, 2020
Research Interests: Pharmacokinetic, Toxicokinetic, and Metabolic Profiling of Small Molecule Drug Candidates and Biologics

Estelle Leclerc, Ph.D.
University Paris XI, 1994
Postdoctoral: ETH-Zurich, 1994-1998; The Scripps Research Institute, 1998-2003
Junior Group Leader Children's Hospital Zurich, 2004
Research Assistant Professor Florida Atlantic University, 2005-2009
Research Interests: Biopharmaceutics

Elisabetta Liverani, Ph.D.
University of the West of England, 2007
Postdoctoral: Temple University, 2010-2016; Queen Mary University of London, 2008-2010
Research Interests: Platelet Function and Regulation During Inflammation, the Role of the P2Y12 Signaling Pathway in Regulating Platelet-Lymphocyte Interactions During Sepsis, Sex-Related Differences in Platelet Activity and Regulation in Patients With Sepsis, Sex-Specific Targeting of Purinergic Signaling Pathways As Novel Drug-Based Therapies for the Improved Treatment of Sepsis

Sanku Mallik, Ph.D.
Case Western Reserve University, 1992
Postdoctoral: California Institute of Technology, 1993-95
Research Interests: Synthetic Medicinal Chemistry

Sijo Mathew, Ph.D.
Central Food Technological Research Institute, 2006
Postdoctoral: University of Tennessee, 2008; Vanderbilt University Medical Center, 2012
Research Interests: Kidney Disease, Pancreatic Cancer, Biopharmaceutics

Stephen T. O'Rourke, Ph.D.
University of Wisconsin, 1985
Postdoctoral: Mayo Clinic and Foundation, 1985-87
Research Interests: Vascular Pharmacology

Jagdish Singh, Ph.D.
Banaras Hindu University, 1982
Postdoctoral: University of Otago, 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: Medical College of Wisconsin, 1996-2000
Research Interests: Central Blood Pressure Control and Hypertension Gene Therapy

Sathish Venkatachalem, Ph.D.
University of Madras, 2003
Postdoctoral: University of Western Ontario, 2004-2006
Research Interests: Human Lung Diseases (Asthma, Chronic Obstructive Pulmonary Disease and Pulmonary Hypertension)

Stefan Vetter, Ph.D.
Swiss Institute of Technology (ETH) Zurich,1998
Postdoctoral: The Scripps Research Institute, 2000-2005
Research Interest: Medicinal Protein Biochemistry

Physics

Department Information

- **Department Chair:**
  Alan Denton, Ph.D.
- **Graduate Coordinator:**
  Mila Kryjevskaia, Ph.D.

- **Department Location:**
  218 South Engineering
- **Department Phone:**
  (701) 231-8974
- **Department Web Site:**
  www.ndsu.edu/physics/ (http://www.ndsu.edu/physics/)
- **Application Deadline:**
  For U.S. students, one month before registration; for international students, March 1 for fall semester and September 1 for spring/summer semester.
- **Credential Offered:**
  Ph.D., M.S., Accelerated M.S.
- **Test Requirement:**
  GRE (general and subject recommended)
- **English Proficiency Requirements:**
  RA - TOEFL 71, IELTS 6, Duolingo 105; TA Grader - TOEFL 79, IELTS 6.5, Duolingo 110; TA Instructor - TOEFL 81, IELTS 7, Duolingo 115

Program Description

The Department of Physics offers graduate study leading to the Master of Science (M.S.) and Doctor of Philosophy (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 2023-2024 academic year stipend is $19,500 for 9 months. Additional support during the summer is also possible.

In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

Research Equipment

North Dakota State University's Materials and Nanotechnology Center is located in the Research and Technology Park. The Center is equipped with two state-of-the-art wet labs, a synthesis lab, optical characterization facilities (optical/NIR fluorescence microscopy, laser-scanning confocal microscopy, and light scattering/reflectometry), and surface characterization facilities (nano-indentation and atomic-force microscopy). There are seven fume hoods in the lab space, as well as a number of synthesis tools, including a Beckman Coulter Optima L-80 XP Ultracentrifuge. We also have access to state-of-the-art chemical synthesis facilities in the Departments of Chemistry and Biochemistry and Coatings and Polymeric Materials, including a Photo Emissions Tech Model SS50AAA Solar Simulator equipped with a Keithley 2400 Series Source meter. NDSU's Center for Computationally Assisted Science and Technology (CCAST) provides large-scale computing resources to NDSU users.

The graduate coordinator or department chair shall assign to each incoming graduate student a temporary adviser, who shall assist in the selection of courses. During the first semester, the student is expected to discuss potential projects for thesis research with faculty members. By the beginning of the second semester, the student must have a permanent research supervisor. By the end of the second semester, the student must have filed a plan of study, selected a thesis topic, and secured two additional faculty members for the Advisory Committee.

Master of Science

Code	Title	Credits
Physics courses number 601-689 or 700-789		10
Didactic courses numbed 601-689 or 700-789		16
PHYS 790	Graduate Seminar	1
PHYS 798	Master's Thesis	6-10
Total Credits		**30**

Students are required to attend all seminars and colloquia.

Accelerated Master of Science

Code	Title	Credits
PHYS 790	Graduate Seminar	1
Choose from the following:		**21**
PHYS 611	Optics for Scientists & Engineers	
PHYS 611L	Optics for Scientists and Engineers Lab	
PHYS 613	Lasers for Scientists and Engineers	
PHYS 615	Elements of Photonics	
PHYS 662	Thermal and Statistical Physics	
PHYS 681	Materials Physics	
PHYS 685	Quantum Mechanics I	
PHYS 686	Quantum Mechanics II	
PHYS 752	Mathematical Methods in Physics I	
PHYS 758	Statistical Physics	
PHYS 761	Electromagnetism	
PHYS 771	Quantum Physics I	
PHYS 781	Solid State Physics	
PHYS 798	Master's Thesis	6-8
Total Credits		**30**

Students must meet all requirements of the Physics bachelor and master programs. For the master's degree, students must earn at least 30 graduate credits, numbered 601-798, with these conditions:

- Up to 15 credits from this list may count toward the bachelor program requirements. It is recommended that students take the 600-level of PHYS 462/662, 481/681, 485/685, and 486/686 while fulfilling the requirements for the bachelor's degree.
- Between 6 and 8 credits are PHYS 798 (Master's Thesis), with the goal to publish a paper based on the thesis research, although this is not a requirement to graduate.
- At least one credit is PHYS 790 Graduate Seminar.

Doctoral Degree

Code	Title	Credits
Required Courses		**16**
PHYS 752	Mathematical Methods in Physics I	
PHYS 758	Statistical Physics	
PHYS 761	Electromagnetism	
PHYS 771	Quantum Physics I	
PHYS 781	Solid State Physics	
PHYS 790	Graduate Seminar	
Letter-graded courses number 601-689 or 700-789		27
PHYS 899	Doctoral Dissertation	
Total credits		**90**

Credits used to satisfy the requirements for the M.S. degree may be included in the total. Students are required to attend all seminars and colloquia.

Preliminary 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 supervisory committee to confirm doctoral candidacy.

Students who pass the preliminary 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 Plan of Study (https://powerforms.docusign.net/7e21cd61-31cc-4cbf-a1e1-c23b2845394c/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) and on the Notification of Scheduled Examination (https://powerforms.docusign.net/0abb6387-c124-45e6-bc80-337a7635ffb0/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7). After students have passed the preliminary examination, they should complete the exit survey and the graduation application (https://powerforms.docusign.net/71b00c0e-af21-4473-bb23-cdbd85983676/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7).

If the student fails the preliminary examination, they 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.

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-Biophysics, Nano-electronics, Single-Molecule science

Andrew B. 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., Department Chair
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 K. Hobbie, Ph.D.
University of Minnesota, 1990
Research Interests: Nanotechnology, Nanoparticles, Polymers, Optics and Rheology

Andrei Kryjevski, Ph.D.
University of Washington, 2004
Research Interests: First-Principles Numerical Techniques for Fermi Systems, Electronic Structure of Nanoparticles

Mila Kryjevskaia, Ph.D., Graduate Program Coordinator
University of Washington, 2008
Research Interest: Physics Education Research

Sylvio May, Ph.D.
Friedrich-Schiller University, 1996
Postdoctoral: Hebrew University Jerusalem, 1997-98
Research Interests: Physics of Lipid Membranes, Biophysics, Ionic Liquids**,** Drug delivery

Kyle Strand, Ph.D.
North Dakota State University, 2022
Research Interests: Computational Soft Matter

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

Orven Swenson, Ph.D.
Air Force Institute of Technology, 1982
Research Interests: Laser Materials Processing, Optics Education

Adjunct Faculty

Khang Hoang, Ph.D.
Michigan State University, 2007
Research Interests: Materials theory, Defect physics, Solid state Ionics

Scott A. Wood, Ph.D.
Princeton University, 1985
Research Interests: Geology

Plant Pathology

Department Information

- **Department Chair:**
  Jack Rasmussen, Ph.D.
- **Department Location:**
  Walster Hall
- **Department Phone:**
  (701) 231-8362
- **Department Web Site:**
  www.ag.ndsu.edu/plantpath/ (http://www.ag.ndsu.edu/plantpath/)
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Credential Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

The Department of Plant Pathology offers graduate study leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees. Advanced degrees may involve specialized training in the following areas: host-parasite genetics, molecular biology and genomics, epidemiology, soil and seed-borne diseases, microbial ecology, and integrated disease management. Student research and academic programs are tailored to individual needs and interests.

Five graduate faculty members are housed in the Northern Crops Science Laboratory located on campus. This relationship provides additional opportunities for research and consultation.

Admission 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 College requirements (p. 25), 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 College 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 College.

Master of Science

Completion of a Master of Science degree is dependent on the completion of 30 semester hours in Plant Pathology or approved courses from related departments. A minimum of 10 credits must reflect research in the desired area.

Doctor of Philosophy

Completion of a Doctor of Philosophy degree is dependent on the completion of 60 semester hours beyond the M.S. degree or 90 credits post-baccalaureate. Courses may include Plant Pathology or approved courses from related departments. A minimum of 10 credits must reflect research in the desired area. Courses focusing on plant science, agronomy, plant breeding, microbiology, entomology and others are offered.

Suzette Arcibal Baldwin
University of Idaho
Research Interests: Extension plant pathology, plant disease diagnosis, development and validation of diagnostic assays, detection and monitoring of new and emerging plant pathogens
Thomas Baldwin, Ph.D.

University of Georgia, 2013

Research Interests: Barley-Pathogen Interactions, RNA-Interference, Fungal Genetics, Fusarium head blight

Eric Branch, Ph.D.
Cornell University, 2023
Research Interests: Extension Plant Pathology, Sugarbeet Diseases, Fungicide Efficacy and Resistance Management

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

Malaika Ebert, Ph.D.
Wageningen University & Research, 2018
Research Interests: Dry Bean and Pulse Crop Pathogens, Molecular Host-Microbe Interactions, Effectors, Secondary Metabolites, Proteins

Andrew Friskop, Ph.D.
North Dakota State University, 2013
Research interests: Extension Plant Pathology, Chemical Control, Corn Diseases, Small Grain Diseases, IPM

Upinder Gill, Ph.D.
Washington State University, 2012
Research Interests: Management of Rust Diseases of Wheat and Other Field Crops, Genetics and Genomics of Host-Pathogen Interactions

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

Jack B. Rasmussen, Ph.D.
Michigan State University, 1987
Research Interests: Molecular Biology and Role in Disease of Pathogen-Produced Toxins, Genetics of Resistance to Cereal Rust Diseases

Gary A. Secor, Ph.D.
University of California-Davis, 1978

Research Interests: Potato Diseases Management and Control, Biotechnology for Cultivar Improvement

Julie Sherman Pasche, Ph.D.
North Dakota State University, 2012
Research Interests: Potato Disease Management, Fungicide Efficacy and Resistance Management, Pathogen Detection and Diversity

Richard Webster, Ph.D.
University of Wisconsin-Madison, 2022
Research Interests: Soybean Disease Management, Varietal Resistance, Chemical Control, IPM, Predictive Modelling

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Guiping Yan, Ph.D.
Washington State University, 2006
Research Interests: Detection, Biology and Management of Soybean Cyst Nematode and Other Plant-Parasitic Nematodes in Field Crops
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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

Melvin Bolton, Ph.D.
USDA/ARS
North Dakota State University, 2006

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

Steven W. Meinhardt, Ph.D.
University of Illinois, 1984
Research Interests: Structure/Function Relationships in Enzymes and Toxins

Michael Wunsch, Ph.D.
Cornell University, 2010
Research Interests: Varietal Disease Resistance, Fungicide Efficacy and Timing, and Use of Cropping Systems t

Berlin D. Nelson, Ph.D.
Washington State University, 1979
Research Interests: Oilseed Diseases, Biological Control, Mycology

Plant Sciences

Department Information

- **Department Head:**
  Richard Horsley, Ph.D.
- **Graduate Coordinator:**
  Marisol Berti, Ph.D.
- **Department Location:**

166 Loftsgard Hall

- **Department Phone:**
  (701) 231-7971
- **Department Web Site:**
  www.ag.ndsu.edu/plantsciences/ (http://www.ag.ndsu.edu/plantsciences/)
- **Application Deadline:**
  International applications must be completed with the Graduate School by October 1 for spring, March 1 for summer, and May 1 for fall. • Domestic applications should completed with the Graduate School at least 2 months prior to the start of classes.
- **Credential Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

The Department of Plant Sciences offers specialized academic and research training in plant breeding and genetics, weed science, biotechnology, and field and forage crop production and management leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in Plant Science with an optional Ph.D. subplan in Plant Breeding and Genetics.

The programs are designed for students looking for a full-time, hands-on research experience in state-of-the-art laboratories and field plots across the state. The Dalrymple Research Greenhouse, extensive growth chamber facilities, and 600 acres of field research land located near the North Dakota State University campus allow our faculty and research technicians to build a program unlike any other in the region.

NDSU College of Agriculture, Food Systems, and Natural Resources has a newly opened (June 2024) 85 million-dollar Peltier Complex to enhance collaborative work with such agricultural programs as Cereal Science without stepping outside. Excellent supporting coursework is offered just steps away from our home building, Loftsgard Hall, in animal sciences, biology, genomics/bioinformatics, microbiology, plant pathology, school of natural resources (entomology, range science, soils) and statistics. Our open curriculum guidelines allow students to tailor their academic and research programs to meet their interests and achieve their career goals.

Graduate student numbers per faculty member are limited, so the student gets adequate personal attention and works closely with their advisor in research. Final selection of the advisor 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.

Admission Requirements

Plant Science graduate programs are open to all qualified graduates of universities and colleges of recognized standing. Applications must be submitted directly to the NDSU Graduate School. To be admitted with full status to the program, the applicant must meet Graduate School and department admission requirements.

B.S. to M.S. and M.S. to Ph.D. Eligibility:
For program admission requirements visit https://www.ndsu.edu/gradschool/apply (https://www.ndsu.edu/gradschool/apply/)

B.S. to Ph.D. Eligibility:
For admission requirements visit https://www.ndsu.edu/gradschool/apply (https://www.ndsu.edu/gradschool/apply/)

Additionally, for the B.S. to Ph.D. in Plant Sciences, at the time of application, the applicant must:

- Have or be working toward a B.S. degree in the same or a closely-related field
- Have a cumulative GPA of 3.70 or greater

Applicants interested in the B.S. to Ph.D. track must:

- Use the Statement of Purpose portion of the application to succinctly describe qualifications for applying to the Ph.D. program as an undergraduate student, including describing preparation for an advanced degree in the chosen area of study and detailing a focused research interest
- Use the Statement of Purpose to identify a Department of Plant Sciences faculty member who has shown definite, written interest in serving as advisor and providing financial and academic support of Ph.D. studies
- Support the Statement of Purpose with a CV listing previous academic and research experiences
- Request three letters of support to accompany the application, two of which will be written by persons able to specifically provide support of the student's potential to complete a Ph.D. program and why the B.S. to Ph.D. track is warranted

Financial Assistance

Correspondence with one or more departmental faculty members before and during the application process is not compulsorily but is encouraged. Applicants will not be considered without a department faculty member who has agreed to serve as the major advisor and can offer a Graduate Research Assistantship (GRA). To read more about our research teams and find faculty contact information, please visit https://www.ndsu.edu/agriculture/academics/academic-units/plant-sciences/research (https://www.ndsu.edu/agriculture/academics/academic-units/plant-sciences/research/).

A twenty-hour (half-time) GRA is provided to each accepted M.S. and Ph.D. student based on scholarship and potential to undertake advanced study and research. The annual stipend varies based on the research project and will not be less than $24,000 annually for a M.S. or $28,000 annually for a Ph.D. position.

In addition to the stipend, graduate assistants who meet the hours worked and training requirements each semester receive a graduate tuition waiver. Students are responsible for differential tuition, student and course fees, and tuition for non-graduate level credits taken.

A limited number of Ph.D. Graduate Fellowships are available.

The Plant Science program has numerous annual scholarships ranging from $400 to $2,200 each for outstanding Plant Sciences graduate students.

Degree Requirements

In the first year, each M.S. or Ph.D. student, in conjunction with their advisor, will form a supervisory committee, create a plan of study that meets disciplinary requirements below as well the goals of the student, and develop a research proposal paper for submission to the department.

Master's Program

The M.S. program requires the completion of at least 30 credits, during which an overall GPA of 3.0 or better must be maintained. The M.S. degree may be earned by either of two options. The Plan A: Thesis Option emphasizes completion of a research project. The Plan B: Comprehensive Study Option requires more course work and instead of conducting research and presenting a thesis, the candidate presents a paper or papers to the supervisory committee, demonstrating ability for scholarly study and written expression.

Candidates working toward either Plan A or Plan B must pass an oral defense, present a public Exit Seminar on the thesis research or comprehensive study, and have their thesis/paper accepted by the Graduate School to complete the degree.

Code	Title	Credits
M.S. Plan A - Thesis Option		**30**
Required Courses		
PLSC 724	Field Design I	3
PLSC 790	Graduate Seminar	1
PLSC 798	Master's Thesis	10
Additional Credits (13 credits must be didactic)**		**16**
Students focusing on Plant Breeding and Genetics must take and earn a B or better in		
PLSC 718	Genetics & Plant Improvement	
PLSC 631	Intermediate Genetics	

Code	Title	Credits
M.S. Plan B - Master's Paper Option		**30**
PLSC 724	Field Design I	3
Additional 600-700 level courses (18 credits must be didactic**)		21
PLSC 790	Graduate Seminar	1
PLSC 797	Master's Paper	3

** Didactic credits are graduate courses numbered 601-689, 691; 700-789, 791; and 800-889, 891.

Doctoral Program

The Ph.D. program requires completion of at least 90 credits, during which time an overall GPA of 3.0 or better must be maintained. A maximum of 20 doctoral dissertation credits may be used to fulfil the total credit requirement. A Plant Breeding and Genetics subplan is available for doctoral students wishing to complete specific coursework, as listed below. To become a Ph.D. candidate, students are required to pass preliminary written and oral examinations directed to academic subject matter. Degree completion follows an oral defense of the dissertation, public Exit Seminar, and acceptance of the dissertation by the Graduate School.

Master of Science Doctoral Track

Qualifying M.S. students accepted will be allowed to use 30 credits from their completed Master's degree toward the Ph.D., thereby completing at least 60 Ph.D. graduate credits rather than 90. No undergraduate courses (100-400) may be counted toward a Ph.D. degree.

Bachelor of Science Doctoral Track

Qualifying B.S. students accepted will be required to complete 90 graduate credits toward the Ph.D. degree. No undergraduate courses (100-400) may be counted toward a Ph.D. degree.

All B.S. to Ph.D. track students must create, defend, and submit a manuscript to a scientific journal by the end of their sixth semester (spring/fall). This manuscript may be used as a chapter in the dissertation.

Code	Title	Credits
M.S. (thesis option) to Ph.D.		**60**
Required Courses		
PLSC 724	Field Design I (if not part of M.S. Must earn B or better)	3
PLSC 790	Graduate Seminar	2
PLSC 892	Graduate Teaching Experience	2
PLSC 899	Doctoral Dissertation	20
Additional didactic credits ** (12 credits must be 700-level)		**24**
Students focusing on Plant Breeding and Genetics must take and earn a B or better in		
PLSC 611	Genomics	
PLSC 631	Intermediate Genetics	
PLSC 718	Genetics & Plant Improvement	
Additional credits		**9**

Code	Title	Credits
M.S. (thesis option) to Ph.D. - Plant Breeding and Genetics Option		**60**
600 - 800 level graduate courses including:		36
PLSC 611	Genomics	
PLSC 631	Intermediate Genetics	
PLSC 718	Genetics & Plant Improvement	
PLSC 724	Field Design I (if not part of master's degree)	
PLSC 731	Plant Molecular Genetics	
PLSC 751	Advanced Plant Genetics	
PLSC 776	Advanced Plant Breeding	
PLSC 782	Population and Quantitative Genetics	
PLSC 790	Graduate Seminar	2
PLSC 892	Graduate Teaching Experience	2
PLSC 899	Doctoral Dissertation	20

** Didactic credits are graduate courses numbered 601-689, 691; 700-789, 791; and 800-889, 891.

Marisol Berti, Ph.D.

North Dakota State University, 2007
Research Interests: Forage and Biomass Crop Production

Bingcan Chen, Ph.D.
University of Massachusetts, 2012
Research Interests: Cereal and Food Chemistry

Michael J. Christoffers, Ph.D.
University of Missouri-Columbia, 1998
Research Interests: Weed Science/Genetics

David Wenhao Dai, Ph.D.
North Dakota State University, 2001

Research Interests: Woody Plant Physiology, Biotechnology

Elias M. Elias, Ph.D.
North Dakota State University, 1987
Research Interests: Durum Wheat Breeding, Genetics

Greta Gramig, Ph.D.
University of Wisconsin-Madison
Research Interests: Weed Biology and Ecology

Andrew J. Green, Ph.D.
Kansas State University, 2016
Research Interests: Hard Red Spring Wheat, Genetics

Harlene Hatterman-Valenti, Ph.D.
Iowa State University, 1993
Research Interests: High-Value Crop Production

Richard D. Horsley, Ph.D.
North Dakota State University, 1988
Research Interests: Barley Breeding, Genetics

Kirk A. Howatt, Ph.D.
Colorado State University, 1999
Research Interests: Weed Science, Annual Weeds

Joseph Ikley, Ph.D.
Purdue University, 2018
Research Interests: Weed Control

Shahidul Islam, Ph.D.
University of Western Australia, 2013
Research Interests: Grain End-use Quality of Hard Wheat

Zhao Jin, Ph.D.
Jiangnan University, 2014
Research Interests: Malting, Food Fermentation

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

Clair Keene, Ph.D.
Pennsylvania State University, 2015
Research Interests: Small Grain Agronomy

Chiwon W. Lee, Ph.D.
Purdue University, 1977
Research Interests: Vegetables, Floriculture, Biotechnology

Deying M. Li, Ph.D.
Iowa State University, 2001
Research Interests: Sports Turf Management

Xuehui Li, Ph.D.
University of Georgia, 2009
Research Interests: Statistical Genomics

Zhikai Liang, Ph.D.
University of Nebraska-Lincoln, 2019
Research Interests: Multiomics of Wheat and Other Crops

Frank A. Manthey, Ph.D.
North Dakota State University, 1985
Research Interests: Durum Wheat Quality, Pasta/Noodle Processing

G. Francois Marais, Ph.D.
North Dakota State University, 1979
University of Stellenbosch, 1992
Research Interests: Hard Red Winter Wheat Breeding, Genetics

Phillip E. McClean, Ph.D.
Colorado State University, 1982
Research Interests: Dry Bean Genetics, Biotechnology

Esther E. McGinnis, Ph.D.
University of Minnesota, 2013
Research Interests: Extension Horticulture, Native Plants, Perennial Hardiness, Floriculture

Michael S. McMullen, Ph.D.
University of Minnesota, 1976
Research Interests: Oat Breeding, Genetics

Carrie Miranda, Ph.D.
University of Missouri, 2018
Research Interests: Soybean Breeding, Molecular Genetics

Juan Osorno, Ph.D.
North Dakota State University, 2006
Research Interests: Dry Edible Bean Breeding

Thomas Peters, Ph.D.
North Dakota State University, 1990
Research Interests: Sugarbeet Agronomy, Weed Science

Mukhlesur Rahman, Ph.D.
University of Manitoba, 2007
Research Interests: Canola Breeding

Jiajia Rao, Ph.D.
University of Massachusetts, 2013
Research Interests: Food Chemistry, Ingredient Technology

Andy Robinson, Ph.D.
Purdue University, 2012
Research Interests: Potato Production

Kalidas Shetty, Ph.D.
University of Idaho, 1989
Research Interests: Food Safety

Asunta L. Thompson, Ph.D.
University of Idaho, 1998
Research Interests: Potato Breeding

Anuradha Vegi, Ph.D.
North Dakota State University, 2008
Research Interests: Teaching Techniques

Todd West, Ph.D.
Southern Illinois University, 2004
Research Interests: Woody Plant Improvement

Minwei Xu, Ph.D.
North Dakota State University, 2019
Research Interests: Food Processing Technology

Qi Zhang, Ph.D.

Kansas State University, 2007
Research Interests: Turfgrass Stress Physiology

Alan J. Zuk, Ph.D.
Kansas State University, 2005
Research Interests: Sports and Urban Turfgrass Management

Adjunct and Affiliate

James V. Anderson, Ph.D.
Virginia Polytech Institute, 1990
Research Interests: Plant Biochemistry

James Beaver, Ph.D.
University of Illinois, 1980
Research Interests: Dry Bean Genetics

David Bonnett, Ph.D.
University of Sydney, 1997
Research Interests: Wheat Breeding

Craig Carlson, Ph.D.
Cornell University, 2018
Research Interests: Cereal Crops

Patrick M. Carr, Ph.D.
Montana State University, 1989
Research Interests: Sustainable Agriculture

Wun Shaw Chao, Ph.D.
University of California-Davis, 1996
Research Interests: Perennial Weeds

Chenggen Chu, Ph.D.
North Dakota State University, 2008
Research Interests: Sugarbeet and Potato Research

Munevver Dogramaci, Ph.D.
Cukurova University/North Dakota State University, 2000
Research Interests: Sugarbeet and Potato Research

Linda Dykes, Ph.D.
Texas A&M University, 2008
Research Interests: Food Science and Technology

Justin D. Faris, Ph.D.
Kansas State University, 1999
Research Interests: Wheat Molecular Genetics

Jason Fiedler, Ph.D.
Scripps Research Institute, 2012
Research Interests: Cereal Crop Genetics

Shana M. Forster, Ph.D.
North Dakota State University, 2017
Research Interests: Crop Production

Jose G. Franco, Jr., Ph.D.
Texas A&M University, 2015
Research Interests: Agroecology, Sustainable Food Systems

Karen L. Fugate, Ph.D.
Ohio State University, 1995
Research Interests: Sugarbeet Physiology

Russell Gesch, Ph.D.

Texas A&M University, 1995
Research Interests: Physiology of Oilseed Crops

Salvador Alejandro Gezan, Ph.D.
University of Florida, 2005
Research Interests: Statistic and Quantitative Genetics

Michael Grusak, Ph.D.
University of California-Davis, 1985
Research Interests: Crop Nutrient Quality

Yong Q. Gu, Ph.D.
University of California, Riverside, 1994
Research Interests: Wheat Genetics

Rajeev Gupta, Ph.D.
University of Cambridge, UK, 1997
Research Interests: Cereal Crops

Darrin Haagenson, Ph.D.
Purdue University, 2001
Research Interests: Crop Physiology and Ecology

Brent Hulke, Ph.D.
University of Minnesota, 2007
Research Interests: Flax and Sunflower Genetics

Brian Jenks, Ph.D.
University of Nebraska, Lincoln, 1996
Research Interests: Integrated Weed Management

Blaine Johnson, Ph.D.
University of Nebraska, 1986
Research Interests: Quantitative Genetics

Audrey Kalil, Ph.D.
University of Wisconsin-Madison, 2015
Research Interests: Pulse Crops

Edward C. Lulai, Ph.D.
North Dakota State University, 1978
Research Interests: Potato Physiology

Kevin McPhee, Ph.D.
University of Idaho, 1995
Research Interests: Pulse Crops

Grant Mehring, Ph.D.
North Dakota State University, 2016
Research Interests: Agronomy; Wheat and Corn Research

Mohamed Mergoum, Ph.D.
Colorado State University, 1991
Research Interests: Hard Red Spring Wheat Breeding

Raj S. Nandety, Ph.D.
University of Delaware, 2011
Research Interests: Small Grains Genotyping

Jae-Bom Ohm, Ph.D.
Kansas State University, 1996
Research Interests: Grain Science

Michael Ostlie, Ph.D.
Colorado State University, 2012

Research Interests: Weed Science

Timothy Porch, Ph.D.
Cornell University, 2012
Research Interests: Dry Bean Breeding and Genetics

Gautam Pradhan, Ph.D.
Kansas State University, 2011
Research Interests: Crop Physiology

Lili Qi, Ph.D.
Nanjing Agricultural University, 1997
Research Interests: Wheat Genetics

James Rogers, Ph.D.
Clemson University
Research Interests: Forage Crop Production

Gerald J. Seiler, Ph.D.
North Dakota State University, 1980
Research Interests: Sunflower and Sugarbeet Germplasm

Senay Simsek, Ph.D.
Purdue University, 2006
Research Interests: Cereal Chemistry and Technology

Brent Trela, Ph.D.
Suranaree University of Technology, Thailand, 2006
Research Interests: Viticulture, Enology

Jochum Wiersma, Ph.D.
University of Minnesota, 1995
Research Interests: Small Grains

Steven S. Xu, Ph.D.
North Dakota State University, 1994
Research Interests: Hard Red Spring Wheat Development

Shengming Yang, Ph.D.
North Dakota State University, 1994
Research Interests: Hard Red Spring Wheat Development

Professional Writing

Department Information

- **Department Location:**
  Department of English
- **Department Phone:**
  (701) 231-7143
- **Department Web Site:**
  www.ndsu.edu/english/ (http://www.ndsu.edu/english/)
- **Credential Offered:**
  Graduate Certificate

The English department offers a graduate certificate in professional writing that is open to students enrolled in graduate degree programs at NDSU as well as professionals who are not currently pursuing a masters or doctorate. The certificate in professional writing offers students the opportunity to develop their written, oral, and digital communication skills in workplace, public, and/or online contexts.

The professional writing certificate promotes competencies such as written communication, visual communication, project planning, interpersonal communication, teamwork, content development and management, and reviewing and editing that can be tailored to students' graduate programs and industry and/or academic-focused professional goals. The graduate certificate is a flexible professional credential that is suited for those interested

in distinguishing themselves through developing their writing skills in their current or future industry positions as well as those interested in technical and professional communication research and pedagogy.

Curriculum

Certificate Requirements

Graduate Professional Writing

Required Minimum Credits: 8-9

Code	Title	Credits
Choose at least one of the following:		
ENGL 649	Usability and User Experience [2]	3
ENGL 655	International Technical Writing [2]	3
ENGL 659	Researching and Writing Grants and Proposal [2]	3
Choose at least one of the following: [1, 2]		
AHSS 672	Introduction to Publishing	3
CHP 660	Scientific Writing for Health Professionals	2
COMM 735	Theories of Media, Technology, and Society	3
COMM 750	Advanced Issues in Communication	3
EDUC 682	Classroom Practice/Methods of Teaching II	2-3
ENGL 656	Literacy, Culture and Identity	3
ENGL 754	Rhetorics of Science, Technology, and Medicine	3
ENGL 758	Topics in Rhetoric, Writing, and Culture	3
ENGL 765	Upper Division Writing: Pedagogy, Practice, and Technology	3
ENGL 795	Field Experience	3
or ENGL 895	Field Experience	
MBA 723	Digital Marketing	2
Total Required Credits		**8-9**

Program Notes:

Graduate students will need to choose a second option from either list to complete the 8-9 total required credits.

1

A course not on this list may be allowed, subject to Certificate Coordinator approval and relevancy to the certificate and its aims. Only one substitution is allowed.

2

A grade of "B" or better in each course is required.

Psychology

Department Information

- **Department Chair:**
  Clayton Hilmert, Ph.D.
- **Graduate Program Coordinators:**
  Jeremy Hamm, Ph.D., Michael Robinson, Ph.D.
- **Department Location:**
  232 B2 Minard
- **Department Phone:**
  (701) 231-8622
- **Department Web Site:**
  ndsu.edu/psychology/graduate/ (http://ndsu.edu/psychology/graduate/)
- **Application Deadline:**
  January 15
- **Credential Offered:**
  Ph.D., M.S.

- **English Proficiency Requirements:**
  TOEFL iBT 79, IELTS 6.5, Duolingo 105

The Department of Psychology at North Dakota State University grants both M.S. and Ph.D. degrees. Our doctoral programs prepare students for a range of research-related careers.

Master's Program

Students pursing a Psychology Ph.D., who have not previously received a master's degree in Psychology or a related field, typically complete the requirements for the M.S. degree in the first two years of their Ph.D. program training. As part of the student's graduate training, students complete course work in areas of departmental research emphasis, as well as methods courses and breadth requirements. Each student will gain research experience under the supervision of a faculty mentor and complete a thesis. Students are not admitted for the sole pursuit of a terminal master's degree.

Doctoral Programs

Our doctoral program accommodates approximately 20 students, with approximately four new Ph.D. degrees awarded each year. Training in the program includes course work in the student's area of emphasis, as well as methods courses, breadth requirements, and research experience under the supervision of a faculty mentor. Training and experience in college-level teaching is an important part of the program, and students also receive training and experience in grant writing.

Financial Assistance

Students are routinely supported through research and teaching assistantships. Applicants are considered based on scholarship and potential to undertake advanced study and research. All students who submit complete applications to the program by the appropriate deadlines are considered for assistantships. Doctoral students are eligible for university fellowships that are awarded on a competitive basis.

Master's Program

In consultation with the adviser and student's supervisory committee a Plan of Study would be developed. The Master of Science in Psychology program requires the completion of 30 credit hours of graduate study beyond the baccalaureate degree with an overall GPA of 3.0 or higher.

Doctoral Program

1. Complete a master's degree in Psychology. This may be done at NDSU or elsewhere.
2. Complete at least 90 hours of graduate credit, including those completed for the master's degree;
   - 60 or more of these credits must be earned at NDSU.
   - 31 or more credit hours must be in approved didactic courses
     - at least 15 must be at the 700 level.
3. Prepare and submit a research grant or fellowship application under the supervision of a faculty mentor. Register for 1-3 credits of PSYC 893 - Grant Writing Experience during the semester you prepare and submit your application. Proposals may be submitted to any sponsor requesting funds for tuition/stipend, research supplies, or other research expenses (e.g., participant payment, software, consultants). There is no minimum amount of funding request required, and the proposal must be submitted but need not be funded.
4. 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.
5. Complete the dissertation. The student will defend a written proposal before their supervisory 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.

Code	Title	Credits
Quantitative and Research Methods		**9**
PSYC 640	Experimental Methods	
PSYC 761	Applied Research Methods	
PSYC 762	Advanced Research Methods and Analysis	
Core Areas of Psychology		**12**
PSYC 720	Advanced Topics in Cognitive Neuroscience	
PSYC 731	Advanced Topics in Cognition	
PSYC 771	Advanced Topics in Social Psychology	
PSYC 787	Advanced Topics in Health Psychology	
Grant Writing in Psychology		**3**
PSYC 763	Grant Writing for Psychological Scientists	

College Teaching		**3**
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	
or STEM 810	Teaching College Science	
Electives - Minimum of four didactic graduate level elective courses from Psychology or other department.		**4**
Teaching of Psychology		**5**
PSYC 892	Graduate Teaching Experience (All students will teach a full semester undergraduate course in psychology for which they should enroll for 5 credits of PSYC 892)	1-6
Submit a grant or fellowship application under the supervision of a faculty mentor.		**1-3**
PSYC 893	Individual Study/Tutorial (Grant Writing Experience)	
Research		
PSYC 899	Doctoral Dissertation	

Benjamin J. Balas, Ph.D.
Massachusetts Institute of Technology, 2007
Field: Brain and Cognitive Sciences

Barbara Blakeslee, Ph.D.
University of California, Santa Barbara, 1983
Field: Biopsychology, Vision Science

Martin D. Coleman, Ph.D.
University of Sussex, 2005
Field: Emotion and Decision Making

Erin Conwell, Ph.D.
Brown University, 2009
Field: Cognitive and Linguistic Sciences

Katherine Duggan, Ph.D.
University of California, Riverside, 2016
Field: Social-Personality and Health Psychology

Jeremy Hamm, Ph.D.
University of Manitoba, 2016
Field: Health and Social Psychology or Developmental Psychology

Clayton J. Hilmert, Ph.D.
University of California, San Diego, 2003
Field: Health and Social Psychology; Stress Psychophysiology, Cardiovascular Health, and Pregnancy

Verlin B. Hinsz, Ph.D.
University of Illinois, 1983
Field: Social and Industrial/Organizational; Small Group Performance, Group Decision Making

Leah Irish, Ph.D.
Kent State University, 2011
Field: Health and Social Psychology, Health Behaviors, Sleep, Stress

Jeffrey S. Johnson, Ph.D.
University of Iowa, 2008
Field: Visual Cognitive Neuroscience

Linda Langley, Ph.D.
University of Minnesota, 1998
Field: Cognitive Neuroscience, Cognitive Aging, Attention

Pan Liu, Ph.D.
McGill University, 2015
Field: Normative Emotion Processing, Biased Processing that Portend Internalizing Outcomes

Mark E. McCourt, Ph.D.
University of California, Santa Barbara, 1982
Field: Biopsychology, Vision Science; Visual Psychophysics, Neuropsychology

Mark Nawrot, Ph.D.
Vanderbilt University, 1991
Field: Visual Neuroscience; Neural Mechanisms for Perception of Depth and Motion, Eye Movements, Alcohol

Michael D. Robinson, Ph.D.
University of California, Davis, 1996
Field: Social/Personality Affective Processes

Laura E. Thomas, Ph. D.
University of Illinois, 2008
Field: Embodied cognition, Links between action, perception, and cognition

Kathryn Wissman, Ph.D.
Kent State University, 2016
Field: Cognitive Psychology

Adjunct

Terence W. Barrett, Ph.D.
University of North Dakota, 1989
Field: Counseling; Issues in Therapy, Forensic Psychology

Scott G. Engel, Ph.D.
North Dakota State University, 2003
Field: Health and Social Psychology; Obesity and Eating Disorders

Holly Hegstad, Ph.D.
University of North Dakota, 1999
Field: Clinical Psychology; Anxiety and Mood Disorders

Jennifer A. Redlin, M.S.
North Dakota State University, 1999
Field: Clinical and Behavioral Psychology

Public Health

Department Information

- **Department Chair:**
  Pamela Jo Johnson, MPH, Ph.D., FACE
- **Department Location:**
  Aldevron Tower 6th Floor
- **Department Phone:**
  (701) 231-6269
- **Department Web Site:**
  www.ndsu.edu/publichealth/ (http://www.ndsu.edu/publichealth/)
- **Application Deadline:**
  Applications will be reviewed on a rolling basis for admission to fall, spring, or summer terms.
- **Credential Offered:**
  MPH
- **English Proficiency Requirements:**
  TOEFL ibT 90; IELTS 6.5; Duolingo 115

Program Description

Public health promotes and protects the health of people and the communities where they live, learn, work, and play. It is both an art and a science and is practiced by multidisciplinary teams of professionals whose training spans a wide array of social, biological, and clinical sciences. Public health professionals conduct research to identify the causes of disease and disability, address social determinants of health through programs and policy, monitor the spread of disease, promote healthy lifestyles through education and community engagement, and implement clinical practice or health and social policy change.

Our program offers specializations in Community Health Sciences and Epidemiology as well as focused courses in maternal and child health and management of infectious diseases. The Master of Public Health (MPH) degree consists of 42 credits and can be completed in two years as a full-time graduate student. In addition, there are options for accelerated bachelor's to master's plans of study for NDSU undergraduate students in Animal Sciences, Dietetics, Emergency Management, Health Services, Microbiological Sciences, and Psychology. Dual degree options and a variety of graduate certificates are also available.

All applicants to the Master of Public Health program must demonstrate adequate preparation in a field related to public health and show potential to undertake advanced study, research, and practical training, as evidenced by previous academic accomplishment and experience.

All admission decisions are based upon full review of all information in the application in order to ensure fairness and to balance the limitations of any single element of the application, including practical experience in the field of public health.

Minimum Program Admission Requirements

1. Completion of both the SOPHAS application (https://sophas.liaisoncas.com/applicant-ux/#/deeplink/programSearch/organization/2696958676395292399) AND NDSU Graduate School application (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB).
2. A baccalaureate degree or equivalent from an accredited college or university (for U.S. degrees, accreditation by one of the six regional accrediting associations: MSA, NASC, NCA, NEASC-CIHE, SACS-CC or WACS-Sr.).
3. An undergraduate and graduate (if applicable) cumulative grade point average (GPA) of at least 3.00. Undergraduate coursework in fields related to public health should generally exceed a GPA of 3.00.
4. No entrance exam is required (e.g., GRE). It is an optional item you can submit if you choose.
5. All graduate applicants must demonstrate academic-level proficiency with the English language before they will be considered for admission.

   This requirement must be met by all applicants, regardless of citizenship, residency, or nation of birth. No applicants will be considered for admission until the English Language Proficiency Requirement has been met. The English Proficiency Requirement will not be waived for any reason. This requirement may be satisfied in any of the following ways:

   - A bachelor's degree or higher from a recognized institution in the United States, England, Scotland, Ireland, Wales, Jamaica, Australia, New Zealand, or English Speaking Canada;
   - An overall minimum band score of 6.5 on the Academic Module IELTS;
   - A satisfactory score on the Test of English as a Foreign Language (TOEFL).The expected minimum score is 233 for the computer-based test, 90 for the Internet-based test, and 577 for the paper-based test.
   - Successful completion of English Language Service (ELS) Language Center's Intensive Level 112.

6. Applicants are required to submit the following supporting documentation

   - Written Statement of Purpose and Goals - Submit a two-page statement describing your reasons for pursuing an MPH, your public health interest areas, and your career goals. Describe any education, skills, or relevant experience that has prepared you for graduate education in public health. In addition, highlight any personal qualities, characteristics, or abilities that will enable you to be successful in achieving your career goals.
   - Resume or Curriculum Vitae (CV)
   - Official post-secondary academic transcripts from all institutions attended (transcripts must be sent directly from the institutions to NDSU)
   - Admissions Tests (as applicable) – scores must be sent by the Educational Testing Service (ETS) directly to NDSU. The institution code for the GRE and TOEFL for North Dakota State University is **6474** and Centralized Application Service for Public Health Programs (SOPHAS) Code **4770**.
   - Two (2) letters of recommendation from individuals who the applicant feels are most qualified to evaluate their academic achievement; clinical, public health or other professional experiences; or leadership potential in public health.

Applications will be reviewed on a rolling basis for admission to fall, spring, or summer terms. Deadlines for domestic and international applicants can be found here: https://www.ndsu.edu/publichealth/degrees_and_programs/admission/.

M.P.H. in Community Health Sciences

Code	Title	Credits
Required Coursework		
PH 675	One Health	2
PH 704	Public Health Management and Policy	3
PH 731	Biostatistics	3
PH 741	Social and Behavioral Sciences in Public Health	3

PH 712	Public Health Research Methods	3
PH 745	Community Health Leadership	3
PH 706	Essentials of Epidemiology	3
PH 794	Practicum	3
PH 789	Integrative Learning Experience (Integrative Learning Experience)	1
Specialization Courses (select from below)		18
Total Credits		**42**

Community Health Sciences OPTION

Code	Title	Credits
PH 700	Preventing and Managing Chronic Illness	3
PH 711	Integrating Primary Care and Public Health	3
PH 722	Applied Community Health	3
PH 725	Promoting Health through Policy, System and Environment	3
Select One Group from below for 6 credits:		**6**
Group One: Maternal and Child Health		
PH 781	Foundations of Maternal and Child Health	
PH 782	Introduction to Maternal and Child Health Epidemiology	
PH 785	Women's Health	
or PH 761	Injury Prevention	
Group Two: Electives (6 credits)		
Group Three: American Indian Public Health		
PH 772	American Indian Health Equity	
PH 774	Research and Evaluation in Tribal Communities	
Total Credits		**18**

NOTE: For PH 794 Applied Practice Experience, students cannot receive credit for past work experience.

NOTE: For more information about MPH options, please visit the website (https://www.ndsu.edu/publichealth/degrees_and_programs/degree_specializations/).

M.P.H. in Epidemiology

Code	Title	Credits
PH 675	One Health	2
PH 704	Public Health Management and Policy	3
PH 706	Essentials of Epidemiology	3
PH 712	Public Health Research Methods	3
PH 731	Biostatistics	3
PH 741	Social and Behavioral Sciences in Public Health	3
PH 745	Community Health Leadership	3
PH 750	Epidemiologic Methods I	2
PH 752	Epidemiologic Methods II	2
PH 753	Public Health Surveillance	2
PH 754	Health Survey Research	2
PH 789	Integrative Learning Experience	1
PH 794	Practicum	3
Select one group from below.		**10**
Group One: Management of Infectious Diseases		
PH 735	Principles of Infectious Disease Management I	
PH 736	Principles of Infectious Disease Management II	
Electives (4 credits)		
Group Two: Maternal Child Health		

PH 781	Foundations of Maternal and Child Health
PH 782	Introduction to Maternal and Child Health Epidemiology
PH 785	Women's Health
or PH 761	Injury Prevention
Electives (3-4 credits)	
Group Three: American Indian Public Health	
PH 772	American Indian Health Equity
PH 774	Research and Evaluation in Tribal Communities
Group Four: Electives	
Electives	
Total Credits	**42**

NOTE: For PH 794 Applied Practice Experience, students cannot receive credit for past work experience.

NOTE: For more information about MPH options, please visit the website (https://www.ndsu.edu/publichealth/degrees_and_programs/degree_specializations/).

Code	Title	Credits
American Indian Public Health		
PH 704	Public Health Management and Policy	3
PH 772	American Indian Health Equity	3
PH 774	Research and Evaluation in Tribal Communities	3
Total Credits		**9**

Code	Title	Credits
General Public Health		
PH 704	Public Health Management and Policy	3
PH 741	Social and Behavioral Sciences in Public Health	3
PH 706	Essentials of Epidemiology	3
PH 745	Community Health Leadership	3
Total Credits		**12**

Code	Title	Credits
Infection Prevention		
PH 704	Public Health Management and Policy	3
PH 735	Principles of Infectious Disease Management I	3
PH 736	Principles of Infectious Disease Management II	3
PH 706	Essentials of Epidemiology	3
Total Credits		**12**

Code	Title	Credits
Maternal and Child Health		
PH 704	Public Health Management and Policy	3
or PH 745	Community Health Leadership	
PH 781	Foundations of Maternal and Child Health	3
PH 782	Introduction to Maternal and Child Health Epidemiology	2
PH 785	Women's Health	1
or PH 761	Injury Prevention	
Total Credits		**9**

Faculty

Akshaya Bhagavathula, Ph.D.

Andrea Huseth, Ph.D., CPH

Bong-Jin Choi, Ph.D.

Mark Strand, Ph.D., CPH

Mary Larson, Ph.D., MPH, RD, CDE, CHES

Pamela Jo Johnson, MPH, Ph.D., FACE

Paul Carson, MD, FACP

Ramona Danielson, Ph.D.

Tracie Newman, MD, MPH, FAAP

Tracy Miller, Ph.D., MPH

Public Policy

Department Information

- **Department Chair:**
  Nicholas Bauroth, Ph.D.
- **Graduate Program Coordinator:**
  Kjersten Nelson
- **Email:**
  Kjersten.nelson@ndsu.edu
- **Department Location:**
  104 Putnam Hall
- **Department Phone:**
  (701) 231-8567
- **Department Web Site:**
  www.ndsu.edu/politicalscience/ (http://www.ndsu.edu/politicalscience/)
- **Credential Offered:**
  M.P.P
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

NDSU's Master of Public Policy (MPP) program provides rigorous training that meets regional, national, and international needs for policy design and program evaluation. The hybrid format means students may attend classes in-person or attend remotely in real time. The program accommodates both traditional students and those who have already begun their careers. Our accelerated master's program allows undergraduate students to complete both their political science major and MPP in five years.

What is an MPP?

A Master of Public Policy prepares students to be policymakers. The coursework helps students to identify policy goals, design effective programs, and evaluate policies to determine if they have met their intended goals. Unlike an MPA (Master of Public Administration), which prepares students to carry out policy implementation, an MPP program trains those who will determine "what works" and generate new policy solutions to social problems.

Why an MPP?

Individuals with MPPs work in government agencies, non-profits, think tanks, political advocacy organizations, and even the private sector. Professionals with MPPs are attractive candidates for organizations that want to evaluate and improve their policies and approaches. MPPs cultivate strategic thinkers who want to do good, and do it well.

Nationally, the number of open jobs listing an MPP as a qualification is large and growing. Analytics firm Burning Glass reports over 300 jobs per year just in North Dakota and the surrounding states, offering an average salary of over $75,000. Universities in the region currently confer substantially fewer MPP degrees than necessary to meet this demand.

Why North Dakota State University (NDSU)?

NDSU provides the only MPP program in the Dakotas and is one of the most cost-effective options for earning an MPP nationwide. The program offers a rigorous sequence of core courses that provide skills in policy design and evaluation, complemented by a variety of electives that allow students to build their knowledge in specific policy areas; these courses cover policy areas ranging from education to infrastructure to international development.

Our faculty have expertise in local, national and international policy. Members of our faculty direct the Upper Midwest Center on Public Policy and Center for Study of Digital Society, and serve as policy consultants with major organizations including USAID and Facebook. Students can also leverage the resources of the newly-created Challey Institute for Global Innovation and Growth.

The NDSU Department of Political Science and Public Policy invites students with a wide array of undergraduate backgrounds to apply for our Masters of Public Policy (MPP). Our program provides students with an in-person and synchronous on-line options for completing degree requirements.

Applicants for the MPP program will complete their application through the Graduate School's online application (https://www.ndsu.edu/gradschool/apply/). The application requires the following:

1. A statement of purpose – why does the applicant wish to pursue a MPP at NDSU?
2. A current resume or CV
3. An academic writing sample – this writing sample might be a paper written for an undergraduate or graduate-level class *or* could be written specifically for this application. The writing sample should demonstrate the applicant's ability to write research or policy-related papers and should be submitted in English.
4. Two letters of recommendation, with at least one preferred to be academic.
5. Transcripts from all institutions the applicant has attended (for undergraduate or graduate study)
6. Optional GRE scores – applicants are not required to complete the GRE, nor will the absence of GRE scores negatively affect the application.
7. Optional statement of extenuating circumstances – if there is anything the applicant would like the admissions committee to know about their circumstances, that is not discussed elsewhere in the application, the applicant may include that here. Applicants are not required to complete a statement of extenuating circumstances, nor will its absence negatively impact the application.
8. International applicants may need to submit TOEFL, IELTS, or Duolingo scores to demonstrate proficiency in English. See the Graduate School's page for more information. (https://www.ndsu.edu/gradschool/apply/international/)

The MPP Admissions Committee will review applications on a rolling basis.

Accelerated MPP

The Department of Political Science and Public Policy is also pleased to offer an accelerated MPP option for current NDSU undergraduates, that allows students to complete a BA/BS in Political Science and an MPP in as little as 5 years.

Students interested in an accelerated masters will complete the same application as those applying for the traditional MPP program (see above). Students must have a 3.5 GPA in order to be admitted, and can matriculate in the program once they have completed 60 undergraduate credits. See the NDSU Catalog for more information about this process. (https://catalog.ndsu.edu/academic-policies/degree-and-graduation/#acceleratteddegreeprogramsugrdtogradtext)

Students are encouraged to talk with their advisers about this option early in their undergraduate careers.

The Master of Public Policy program is 36 credits from the list below.

Code	Title	Credits
Core Courses		24
POLS 623	Public Policy Analysis	
or POLS 710	Global Public Policy	
POLS 705	Policy Design and Evaluation	
POLS 724	Public Budgeting and Finance	
POLS 726	Harm Reduction for Policymakers	
POLS 633	Law and Public Policy	
POLS 701	Quantitative Methods for Public Policy	
or POLS 670	Quantitative Methods for Political Science and Public Policy	
POLS 702	Qualitative Methods for Impact Evaluations	
or POLS 703	Advanced Policy Analysis	
POLS 780	Masters of Public Policy Capstone	
Electives		12
POLS 622	State and Local Politics	
POLS 644	International Law	
POLS 650	Politics of the Developing Countries	
POLS 652	Comparative Political Economy	
POLS 653	Environmental Policy and Politics	
POLS 654	Comparative Democratic Institutions	

POLS 670	Quantitative Methods for Political Science and Public Policy
POLS 762	New Institutionalism in Political Science
POLS 796	
GEOL 680	Geographic Information Systems Pattern Analysis and Modeling
ECON 661	Economic Development
ECON 670	Public Economics
ECON 675	Health Economics
ECON 681	Natural Resource Economics
ECON 682	Environmental Economics
ECON 762	New Institutional Economics
EMGT 610	
HDFS 719	Youth Policy
HDFS 760	Aging Policy and Advocacy
PSYC 653	Organizational Psychology
SOC 605	Community Development
SOC 733	Organizations and the State
BUSN 690	Graduate Seminar (IDEAS Research Workshop)
Total Credits	**36**

Accelerated students can take 15 credits towards the MPP in the course of their standard undergraduate career. During the fifth year, students would take the remaining 21 credits from the curriculum above.

Thomas Ambrosio, Ph.D. (https://www.ndsu.edu/politicalscience/dr_thomas_ambrosio/)
University of Virginia, 2000
Research Interests: International Relations, Russian Foreign Policy, Stability of Authoritarian Regimes

Nicholas Bauroth, Ph.D. (https://www.ndsu.edu/politicalscience/dr_nicholas_bauroth/)
Loyola University Chicago, 2003
Research Interests: American Government, State and Local Government and Politics, Public Policy

Sarah Boonstoppel, Ph.D. (https://www.ndsu.edu/politicalscience/dr_sarah_boonstoppel/)
University of Maryland, 2014
Research Interests: Crime Policy, Continuity and Change in Offending Among Parents, the Role of Social Institutions During the Transition to Adulthood

Steven Briggs, Ph.D. (https://www.ndsu.edu/politicalscience/dr_steven_briggs/)
University of Nebraska at Omaha, 2007
Research Interests: Law and Society, Crime and Public Policy, Police Reform and Governance

Elizabeth Carlson, Ph.D. (https://www.ndsu.edu/politicalscience/dr_elizabeth_carlson/)
University of California Los Angeles, 2011
Research Interests: Political Behavior, Public Opinion and Survey Methods, Lab and Field Experimentation, the Political Economy of Development in Africa

Kjersten Nelson, Ph.D. (https://www.ndsu.edu/politicalscience/dr_kjersten_nelson/)
University of Minnesota, 2009
Research Interests: American Politics, Gender and Politics, US Courts

Daniel Pemstein, Ph.D. (https://www.ndsu.edu/politicalscience/dr_daniel_pemstein/)
University of Illinois, 2010
Research Interests: Democratic Institutions, Internet Politics and Policy, Comparative Political Economy, Methodology

Publishing

Department Information

- **Director:**
  Suzzanne Kelley, Ph.D.
- **Department Web Site:**
  ndsupress.org/certificate-in-publishing/ (http://ndsupress.org/certificate-in-publishing/)

- **Credential Offered:**
  Graduate Certificate

The graduate certificate in Publishing offers students in-depth real-world experience with an established publishing house, NDSU Press. Established in 1950, the NDSU Press publishes peer-reviewed manuscripts in any field of learning that contribute to scholarly knowledge of the region or public consciousness of the region.

Students in the Publishing certificate program gain hands-on experience in publishing scholarly and literary works. Students learn about product planning and design, editing, marketing, author relations, business and copyright law, publishing industry operations, contracting and purchasing, electronic publishing and marketing, and professional standards and ethics.

Application Requirements

In addition to the Graduate College application requirements (https://catalog.ndsu.edu/graduate/admission-information/#:~:text=of%20academic%20performance-,Application%20Requirements,-All%20degree%20and), applicants must write a statement (approximately 500 words) explaining their interest in the certificate program. In the statement of purpose, applicants are encouraged to describe any relevant academic or professional experiences.

The Publishing certificate program admits students in the fall and spring semesters.

Certificate Requirements

Code	Title	Credits
AHSS 672	Introduction to Publishing	3
AHSS 676	Practicum in Publishing	3
AHSS 695	Field Experience	3
Total Credits		**9**

Rhetoric, Writing and Culture

Department Information

- **Department Chair:**
  Sean Burt, Ph.D.
- **Graduate Coordinator:**
  Alison Graham-Bertolini, Ph.D.
- **Department Location:**
  318 Minard Hall
- **Department Phone:**
  (701) 231-7143
- **Department Web Site:**
  www.ndsu.edu/english/graduate/phd_rhetoric_theory_and_culture/ (http://www.ndsu.edu/english/graduate/phd_rhetoric_theory_and_culture/)
- **Application Deadline:**
  Application review begins Feb. 1 and continues until all spots are filled.
- **Credential Offered:**
  Ph.D.
- **English Proficiency Requirements:**
  TOEFL ibt 100; IELTS 7; Duolingo 125

The Doctor of Philosophy (Ph.D.) degree program in Rhetoric, Writing and Culture 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 North Dakota State University'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.

To be admitted with full status to the program, the applicant must fulfill all of the requirements set out below.

- In most cases, applicants are expected to have completed a Master of Arts or Science, but exceptional candidates may be admitted directly out of the bachelor's degree
- Have completed a Bachelor of Arts, Bachelor of Science, Master of Arts, or Master of Science 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 addition to the Graduate School required materials, applications must include:

- an academic writing sample, not to exceed 20 pages, that reflects the student's academic or professional interests and that demonstrates the student's critical and analytical abilities
- A statement of purpose that includes the following:
  - coursework you plan to complete in the program
  - faculty members with whom you wish to study
  - research you plan to pursue
  - a sense of what you hope to do once you have completed a doctoral degree in English
  - how your education and/or life experience have prepared you for graduate work
- official transcripts from all previous undergraduate and graduate institutions
- a letter stating your interest in and qualifications for a teaching assistantship.

Financial Assistance

Teaching assistantships are available and awarded based on the applicant's scholastic record and letters of recommendation. Students need to apply to the Graduate College to be considered for admission in the Department of English and before they are eligible for an assistantship. Letters of interest for teaching assistantships, detailing prior experience (if applicable) and qualifications, need to be submitted as part of the application to the program.

Teaching assistantships are reviewed and renewed annually based on academic and professional performance, as well as funding. The annual stipend is $14,000. In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits. Teaching assistants are responsible for books and fees.

In rare cases, teaching fellowships may be granted to advanced doctoral students who have passed their preliminary examinations and completed their course work. Scholarships (https://www.ndsu.edu/english/contact/opportunities/) are available through the department, the academic college, the Graduate College, and the university.

The Ph.D. program requires 90 credits beyond the baccalaureate degree and a minimum of 60 graduate credits taken beyond the Master of Arts and at NDSU.

- Students must take 48 of 60 graduate credits from within the Department of English.
- Students must take a minimum of 30 credits at the 700- or 800-level.
- ENGL 764 Teaching Workshop for Writing Instructors is required of all graduate teaching assistants who have not taken a similar class elsewhere.
- Students with a master’s degree in another discipline may be required to complete additional graduate course work in specific areas of English, as specified by their adviser and supervisory committee.
- No more than 10 credits may be transferred into the program.

Anastassiya Andrianova, Ph.D.
City University of New York, 2011
Field: British Romantic and Victorian Literature, Drama, Translation, Pedagogy, Postcolonial Literature, Slavic Literature, Animal Studies

Lisa R. Arnold, Ph.D.
University of Louisville, 2011
Field: Rhetoric and Composition, Writing Program Administration, History of Writing Instruction

Sean Burt, Ph.D.
Duke University, 2009
Field: Ancient Jewish Literature, Genre Theory, Ancient Hebrew Poetry, Poetics, Horror Literature & Theory

Adam Goldwyn, Ph.D.
City University of New York, 2010
Field: Medieval Studies, Medieval Greek World, Influence of Ancient Greek Culture in the Middle Ages

Amy Gore, Ph.D.
University of New Mexico, 2019
Field: Early Indigenous and American literatures, Book history, Gothic literature, Body studies, and the Recovery of marginalized women and Native American writers

Alison Graham-Bertolini, Ph.D.
Louisiana State University, 2009
Field: Contemporary American Literature, Literature of the Southern United States, Women's Literature, Contemporary Ethnic and Postcolonial Literature

Daniel Kenzie, Ph.D., Affiliated Faculty
Purdue University, 2017
Rhetoric & Composition, Professional & Technical Writing, Rhetoric of Health & Medicine, Disability Studies

Verena Theile, Ph.D.
Washington State University, Pullman, 2006
Field: 16th/17th Century Literature, Shakespeare, Early Modern Drama, European Literature, Literary Theory, Science Fiction and Fantasy, Film and Adaptation Studies

Emeritus Faculty

Linda L. Helstern, Ph.D., Emerita
Southern Illinois University-Carbondale, 2001
Field: Native American Literature, Modernism, Contemporary Poetry, Literature and the Environment

R.S. Krishnan, Ph.D., Emeritus
University of Nebraska, 1981
Field: Restoration and 18th-Century British Literature, Postmodern Theories, British Novel, Postcolonial Literature

Bruce Maylath, Ph.D., Emeritus
University of Minnesota, 1994
Field: International Technical Communication, Rhetoric and Composition, Linguistics

Robert O'Connor, Ph.D., Emeritus
Bowling Green State University, 1979
Field: Romantic Literature, Science Fiction and Fantasy

Dale Sullivan, Ph.D., Emeritus
Rensselaer Polytechnic Institute, 1988
Field: Rhetoric Theory and History, Rhetoric of Science, Rhetoric of Religion, Technical Communication

Sociology

Department Information

- **Department Chair:**
  Christina Weber, Ph.D.
- **Graduate Coordinator:**
  Kristen Fellows, Ph.D.
- **Department Location:**
  Minard 428
- **Department Phone:**
  (701) 231-8657
- **Department Email:**
  ndsu.soc.anth@ndsu.edu
- **Department Web Site:**

www.ndsu.edu/socanth (http://www.ndsu.edu/socanth/)

- **Application Deadline:**
  For full consideration, applications must be received by February 1 for fall semester
- **Credential Offered:**
  M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

The Department of Sociology and Anthropology offers the Master of Science (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.

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.

Three program options are available for students. In the thesis option (Plan A), students work on a research-based thesis. Students typically test theoretical assumptions using primary or secondary data. The comprehensive study option (Plan B) is designed for students who wish to pursue an applied topic of study. Students electing this option are required to complete a comprehensive study paper. The culminating experience option (Plan C) requires a final examination in place of a thesis or paper.

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 meeting the Graduate College requirements (p. 25), 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 admission application, official transcripts, and three letters of reference must be received by the Graduate College no later than February 1.

Students will write a master's thesis (Plan A), complete a comprehensive study paper (Plan B), or pursue a culminating experience exam (Plan C). The student's schedule of courses must be approved by the faculty adviser.

Students in the master's thesis option (Plan A) complete a minimum of 30 credits, including at least 16 didactic credits, and a master's thesis. Students in the comprehensive study option (Plan B) complete a minimum of 30 credits, including at least 21 didactic credits, and a master's paper. Students in the culminating experience option (Plan C) complete a minimum of 33 credits, including at least 21 didactic credits, and an exam. An oral defense of the thesis, research paper, or exam is required.

Requirements for the M.S. degree in sociology are as follows:

Code	Title	Credits
SOC 723	Social Theory	3
SOC 700	Qualitative Methods	3
SOC 701	Quantitative Methods	3
Complete an additional 21 credits (including thesis or research paper) or 24 credits (including culminating experience exam)		
Complete a research-based thesis, comprehensive study paper, or comprehensive exam and pass an oral defense of the thesis, paper, or exam administered by the student's supervisory committee.		

Pamela Emanuelson, Ph.D.
University of South Carolina, 2008
Research Interests: Small Group Processes, Social Psychology, Mathematical Sociology. Economic Sociology, Sociopolitical Evolution

Dane R. Mataic, Ph.D.

The Pennsylvania State University, 2018
Research Interests: Mobilization, International Conflict, Social Inequalities, Sociology of Religion, Organizations

Christina D. Weber, Ph.D.
State University of New York - University at Buffalo, 2005
Research Interests: Social Theory, Feminist Theory, Sociology of Gender, Memory and Trauma Studies, Social Change

Christopher M. Whitsel, Ph.D.
Indiana University, 2009
Research Interests: Social Inequality, Research Methods, Global Comparative Sociology, Post-Soviet Central Asia

Lecturers

Leretta Smith, Ph.D.
South Dakota State University, 2007
Research interests: Family, Education, and Gender

Software Engineering / Software and Security Engineering

Department Information

- **Department Chair:**
  Simone Ludwig, Ph.D.
- **Program Coordinator:**
  Changhui Yan, Ph.D.
- **Department Location:**
  258 QBB
- **Department Phone:**
  (701) 231-8562
- **Department Email:**
  gradinfo@cs.ndsu.edu
- **Department Web Site:**
  ndsu.edu/cs/ (http://ndsu.edu/cs/)
- **Application Deadline:**
  February 1 priority deadline for fall admission; September 1 for spring admission* No summer admission for any Software Engineering Program
- **Credential Offered:**
  Ph.D., M.S., M.S.E, Certificate
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

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. Security engineering is the process of applying knowledge to build secure systems by identifying security vulnerabilities and incorporating control measures to minimize or contain the risks associated with these vulnerabilities. It involves protecting systems, networks, devices, programs, and data from unauthorized access and destruction by implementing effective cybersecurity measures to meet the security goals of Confidentiality, Integrity, and Availability.

The Department of Computer Science offers a graduate certificate in Software Engineering, Master of Software Engineering (M.S.E), Master of Science (M.S.) in Software and Security Engineering, and Doctor of Philosophy (Ph.D.) in Software and Security 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 M.S.E. is an online coursework only program aimed at professionals while the M.S. in Software and Security Engineering is a coursework and research program. For additional information, see the **Computer Science websit**e (or contact the Computer Science department at (701) 231-8562 or **gradinfo@cs.ndsu.edu**).

**Spring admissions are given only occasionally, depending on funding and faculty interest. If there are no spring openings, spring applicants are automatically considered for the subsequent fall semester.*

In addition to the **Graduate College requirements**, applicants must fulfill the program requirements listed below:

Software Engineering Certificate

1. Bachelor of Science (B.S). or equivalent degree from
an educational institution of recognized standing, including 12 semester hours or equivalent of Computer Science or Software Engineering courses from an educational institution of recognized standing, or at least one year full-time professional software engineering experience;
2. Programming skill in a modern higher level programming language, preferably C++, C#, or Java;
3. A 3.0 (on a 4.0 scale) GPA in previous coursework. Conditional admission may be given with a 2.85 or higher GPA and professional experience.

Master of Software Engineering

1. A B.S. or equivalent degree from an educational institution of recognized standing, including 12 credit 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. GRE score is not required for admission. However, a GRE score above the median (50th percentile) for the quantitative reasoning portion is strongly recommended for gaining priority in assistantships;
4. International applicants are welcome. International students from some countries are exempt from English proficiency examination requirement (See details at https://www.ndsu.edu/gradschool/apply/international). Others must submit TOEFL, IELTS, PTE Academic score or Duolingo 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; or
   - Duolingo score of 105.
5. A 3.0 (on a 4.0 scale) GPA in previous coursework. Conditional admission may be given with a 2.85 or higher GPA and professional experience.

Master of Science in Software and Security Engineering

1. A 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. GRE score is not required for admission. However, a GRE score above the median (50th percentile) for the quantitative reasoning portion is strongly recommended for gaining priority in assistantships.
3. International applicants are welcome. International students from some countries are exempt from English proficiency examination requirement (See details at https://www.ndsu.edu/gradschool/apply/international). Others must submit TOEFL, IELTS, PTE Academic score or Duolingo 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; or
   - Duolingo score of 105.
4. Eligibility for a teaching assistantship/tutor requires the following additional requirements:
   - minimum TOEFL ibT score of 81 (IELTS of 7, PTE of 54, Duolingo of 115),
     - TOEFL ibT Speaking subscale score of 23 or above and
     - TOEFL ibT Writing subscale score of 21 or above
     - IELTS equivalent scores are 6.0 and 6.0 respectively
     - PTE Academic equivalent scores are 62 and 56, respectively
     - Duolingo score is 115 or greater.
5. Programming skill with one modern higher level programming language, preferably C++, C#, or Java.
6. A 3.0 (on a 4.0 scale) GPA in all previous coursework.

Doctor of Philosophy in Software and Security Engineering

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.
   a. 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.
   b. 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.
   c. 18 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.

2. GRE score is not required for admission. However, a GRE score above the median (50th percentile) for the quantitative reasoning portion is strongly recommended for gaining priority in assistantships.
3. International applicants are welcome. International students from some countries are exempt from English proficiency examination requirement (See details at https://www.ndsu.edu/gradschool/apply/international). Others must submit TOEFL, IELTS, PTE Academic score or Duolingo 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; or
   - Duolingo score of 105.
4. Eligibility for a teaching assistantship/tutor requires the following additional requirements:
   - minimum TOEFL ibT score of 81 (IELTS of 7, PTE of 53, Duolingo of 115),
     - TOEFL ibT Speaking subscale score of 23 or above and
     - TOEFL ibT Writing subscale score of 21 or above
     - IELTS equivalent scores are 6.0 and 6.0 respectively
     - PTE Academic equivalent scores are 62 and 56, respectively
     - Duolingo score is 115 or greater.
5. Programming skill in at least 1 higher level programming language, preferably C++, C#, or Java.

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 monthly stipend. In addition to the stipend, graduate assistants with a 20 hours/week assistantship receive a full graduate tuition waiver. Graduate assistants with an assistantship that is less than 20 hours/week but at least 10 hours/week receive a 50% graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

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. Relevant 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 for one or two semesters.

Software Engineering Certificate

Code	Title	Credits
CSCI 713	**Software Development Processes**	**3**
Select two of the following:		**6**
CSCI 714	Software Project Planning and Estimation	
CSCI 715	Software Requirements Definition and Analysis	
CSCI 716	Software Design	
CSCI 717	Software Construction	
CSCI 718	Software Testing and Debugging	
CSCI 848	**Empirical Methods in Software Engineering**	**3**
Total Credits		**12**

Master of Software Engineering (online)

Code	Title	Credits
Core Courses		
CSCI 713	Software Development Processes	3
CSCI 715	Software Requirements Definition and Analysis	3
CSCI 716	Software Design	3
CSCI 718	Software Testing and Debugging	3
CSCI 714	Software Project Planning and Estimation	3
CSCI 717	Software Construction	3
CSCI 848	Empirical Methods in Software Engineering	3
Electives - 9 Credits		9

Online CSCI courses at the 600, 700, and 800 levels	
Total Credits	**30**

Master of Science in Software and Security Engineering

Code	Title	Credits
Core Courses		**12**
CSCI 702	Survey of Cybersecurity	
CSCI 706	Data-Driven Security	
CSCI 713	Software Development Processes	
CSCI 716	Software Design	
Additional required courses		**5**
CSCI 790	Graduate Seminar	
CSCI 848	Empirical Methods in Software Engineering	
Software engineering focus select from:		**9**
CSCI Courses in the ranges of 611-619 and 711-719		
CSCI 765	Introduction to Database Systems	
Cybersecurity focus - select from:		**9**
CSCI Courses in range 601-610 excluding 603 and 605		
CSCI Courses in range 701-710, excluding core courses		
CSCI 765	Introduction to Database Systems	
CSCI 773	Foundations of the Digital Enterprise	
Plan A: Master's Thesis		**6**
CSCI 798	Master's Thesis (6 credits)	
Plan B: Master's Paper		**6**
Other Computer Science or Software Engineering Courses (3 credits)		
CSCI 797	Master's Paper (3 credits)	
Total Credits		**32**

Additional requirements for Master of Science in Software and Security Engineering:

- Research adviser should be selected by the end of the second semester at NDSU.
- A maximum of two courses (6 credits) at the 600 level.
- Field Experience/Practicum credits do not count.
- Courses on topics that are typically considered to be part of computer science, such as AI, machine learning, software engineering, etc. should be taken in the Computer Science Department. Outside courses (courses without a CSCI prefix) need prior approval by the graduate coordinator and the research advisor and should only be approved if a course with similar content is not already offered by our department. A syllabus might need to be submitted by the student wanting to take a particular course from another department to ensure adequate coverage of computer science content.
- All course work must be approved by the student's adviser, Supervisory Committee, graduate coordinator, and graduate dean through the Plan of Study.
- A Plan of Study listing coursework and examination committee members should be completed by the end of the second semester at NDSU.
- A maximum of 9 credits may be transferred into the program.
- Successful completion of the Final Oral Examination on the dissertation for Plan A and B.

Doctor of Philosophy in Software and Security Engineering

Bachelor's to Doctor of Philosophy in Software and Security Engineering

Code	Title	Credits
Core courses:		**12**
CSCI 702	Survey of Cybersecurity	
CSCI 706	Data-Driven Security	
CSCI 713	Software Development Processes	

CSCI 716	Software Design	
Additional required courses		**6**
CSCI 790	Graduate Seminar	
CSCI 848	Empirical Methods in Software Engineering	
Software engineering focus select from:		**9**
CSCI Courses in the ranges of 611-619 and 711-719		
CSCI 765	Introduction to Database Systems	
Cybersecurity focus - select from:		**9**
CSCI Courses in range 601-610 excluding 603 and 605		
CSCI Courses in range 701-710, excluding core courses		
CSCI 765	Introduction to Database Systems	
CSCI 773	Foundations of the Digital Enterprise	
All Students:		
Software engineering & cybersecurity courses approved by the student's Supervisory Committee. (15-27 credits)		
CSCI 899	Doctoral Dissertation (36-48 credits)	
Total Credits		90

Master's to Doctor of Philosophy in Software and Security Engineering

Code	Title	Credits
Core courses:		**12**
CSCI 702	Survey of Cybersecurity	
CSCI 706	Data-Driven Security	
CSCI 713	Software Development Processes	
CSCI 716	Software Design	
Additional required courses		**6**
CSCI 848	Empirical Methods in Software Engineering	
CSCI 790	Graduate Seminar	
Software engineering focus select from:		**9**
CSCI Courses in the ranges of 611-619 and 711-719		
CSCI 765	Introduction to Database Systems	
Cybersecurity focus - select from:		**9**
CSCI Courses in range 601-610 excluding 603 and 605		
CSCI Courses in range 701-710, excluding core courses		
CSCI 773	Foundations of the Digital Enterprise	
CSCI 765 - Introduction to Database Systems		
All Students:		
Software engineering & cybersecurity courses approved by the student's Supervisory Committee. (0-3 credits)		
CSCI 899	Doctoral Dissertation (30-33 credits)	
Total Credits		60

Doctor of Philosophy + Master of Science in Software and Security Engineering

Code	Title	Credits
Core courses:		**12**
CSCI 702	Survey of Cybersecurity	
CSCI 706	Data-Driven Security	
CSCI 713	Software Development Processes	
CSCI 716	Software Design	
Additional required courses		**6**
CSCI 790	Graduate Seminar	
CSCI 848	Empirical Methods in Software Engineering	
Software engineering focus select from:		**9**

CSCI Courses in the ranges of 611-619 and 711-719		
CSCI 765	Introduction to Database Systems	
Cybersecurity focus - select from:		**9**
CSCI Courses in range 601-610 excluding 603 and 605		
CSCI Courses in range 701-710, excluding core courses		
CSCI 765	Introduction to Database Systems	
CSCI 773	Foundations of the Digital Enterprise	
All Students:		
Software engineering & cybersecurity courses approved by the student's Supervisory Committee. (15-27 credits)		
CSCI 899	Doctoral Dissertation (36-48 credits)	
Total Credits		90

Additional requirements for the Bachelor's to Doctor of Philosophy and Master's to Doctor of Philosophy options:

- 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 Software and Security Engineering Core Courses listed above; none of these can be individual study course credits.
- A maximum of two courses at the 600 level. Field Experience/Practicum credits do not count.
- Students who took core courses as part of their M.S. studies at NDSU should discuss replacement courses with the adviser and the Graduate program coordinator.
- Courses on topics that are typically considered to be part of computer science, such as AI, machine learning, software engineering, etc. should be taken in the Computer Science Department. Outside courses (courses without a CSCI prefix) need prior approval by the graduate coordinator and the research advisor and should only be approved if a course with similar content is not already offered by our department. A syllabus might need to be submitted by the student wanting to take a particular course from another department to ensure adequate coverage of computer science content.
- All course work must be approved by the student's adviser, supervisory committee, graduate coordinator, and graduate dean through the plan of study.
- A Plan of Study listing coursework and supervisory committee members should be completed by the end of the second semester at NDSU.
- 30-48 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.
- Students who applied the listed core courses towards a M.S. degree obtained from NDSU can take up to 42 research credits.
- Satisfactory completion of the Comprehensive Exam at the Ph.D. level (written exam based on the core courses).
- Research proposal presentation and preliminary oral examination (Qualifying Exam) should be completed by the fourth semester at NDSU after passing the Comprehensive Exam.
- Successful completion of the Final Oral Examination on the dissertation.

Additional requirements for the Doctor of Philosophy + Master of Science option:

- Ph.D. students in this option will earn a Master of Science degree after they pass the preliminary oral examination (Qualifying Exam).
- Students will need to submit a Ph.D. Plan of Study indicating "Ph.D. + Master's" as the degree.
- Before a student can apply to take the preliminary oral examination (Qualifying Exam), they must have

    1. passed the comprehensive exam.
    2. completed 30 credits, of which 21 credits need to be didactic credits at the graduate level at NDSU.
    3. submitted a paper as first author to a high-quality journal or conference on a topic related to their Ph.D. dissertation.

- After students have passed the preliminary examination, they must complete the Graduate School Graduation Application (https://powerforms.docusign.net/71b00c0e-af21-4473-bb23-cdbd85983676/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) in order for their M.S. degree to be posted to their academic record.
- Students will be eligible to participate in commencement of their M.S. degree the term they pass the preliminary oral examination (Qualifying Exam).
- Research advisor 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 Software and Security Engineering core courses listed above; none of these can be individual study course credits.
- A maximum of two courses at the 600 level.
- All course work must be approved by the student's advisor, supervisory committee, and graduate coordinator through the plan of study.
- A Plan of Study listing coursework and supervisory committee members should be completed by the end of the second semester at NDSU.

- 30-48 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.
- Successful completion of the final defense of the dissertation.

Zahid Anwar, Ph.D.
University of Illinois at Urbana-Champaign, 2008
Research Interests: Cybersecurity Policy and Law, Artificial Intelligence and Machine Learning

Anne Denton, Ph.D.
University of Mainz, 1996
Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Databases, Geospatial Data, Cloud Computing

Ajay Jha, Ph.D.
Kyungpook National University, 2017
Research Interests: Software Engineering, Software Testing and Maintenance

Jun Kong, Ph.D.
University of Texas, Dallas, 2005
Research Interests: Human Computer Interaction, Mobile Computing, Software Engineering

Pratap Kotala, Ph.D.
North Dakota State University, 2015
Research Interests: Software Engineering

Juan (Jen) Li, Ph.D.
University of British Columbia, 2008
Research Interests: Smart and Connected Health, Semantic Web Technologies, Internet of Things (IoT)

Lu Liu, Ph.D.
University of Texas San Antonio, 2017
Research Interests: Bioinformatics, Data Mining, Machine Learning, Data Science

Simone Ludwig, Ph.D.
Brunel University, 2004
Research Interests: Swarm Intelligence, Evolutionary Computation, Deep Neural Networks, Fuzzy Reasoning, Machine Learning

Kenneth Magel, Ph.D.
Brown University, 1977
Research Interests: Software Engineering, Human-Computer Interfaces, Software Complexity, and Software Design

M. Zubair Malik, Ph.D.
University of Texas at Austin, 2014
Research Interests: Program Analysis, Automated Program Repair, Secure Software Development, Software Verification-Validation and Testing, Software Systems (especially large scale Distributed Systems for Data science and Machine Learning), Formal Methods, Application of Artificial Intelligence in Program Analysis

Oksana Myronovych, Ph.D.
North Dakota State University, 2009
Research Interests: Software Engineering

Saeed Salem, Ph.D.
Rensselaer Polytechnic Institute, 2009
Research Interests: Bioinformatics, Machine Learning and Data Mining

Jeremy Straub, Ph.D.
University of North Dakota, 2015
Research Interests: Multi-tier Mission Architecture & Control, Autonomous Data Link Reduction, Autonomous Vehicle Control, Machine Vision, Super Resolution

Vasant Ubhaya, Ph.D.
University of California-Berkeley, 1971
Research Interests: Algorithm Analysis, Approximation and Optimization

Changhui Yan, Ph.D.
Iowa State University, 2005

Research Interests: Bioinformatics, Computational Biology, Genomics, Machine Learning, Data Mining, Big Data, Cloud Computing

Sport Management

Department Information

- **Sport Management Program Coordinator:**
  Joel White, Ph.D.
- **Department Phone:**
  (701) 231-8208
- **Department Email:**
  joel.white@ndsu.edu
- **Credential Offered:**
  M.S., Certificate

The Master of Science in Sport Management (MSM) is a fully online graduate program consisting of 30 total credit hours. Nine credits of coursework make up the core that all MSM students are required to take. The remaining 21 credits will be filled by elective courses. In addition to electives, students also have the option of completing the 15-credit Intercollegiate Athletic Administration (IAA) graduate certificate.

The MSM is designed to help students further their sport management education and make them sought-after by employers. The MSM provides advanced studies designed to fully prepare students for a career in the sports industry. As the number of sport management programs increases, students may need to further differentiate themselves by earning a master's degree. While the number of opportunities to work in the industry may be growing, so too is the number of sport management graduates being produced to fill those opportunities. A graduate degree gives students the chance to distinguish themselves from other job seekers. Additionally, a master's degree can help employees stand out in the industry when being considered for promotion and advancement within organizations.

The online degree gives students the flexibility of being able to complete their coursework anywhere and can be tailored to fit the schedule of the student – serving both the traditional student as well as the professional. Currently the number of distance programs in sport management in the region has dropped – NDSU's MSM fills a need of area professionals to be able to complete their graduate degree in a program delivered entirely online.

Accelerated Degree Option

Additionally, Students interested in continuing their education in sport management beyond their bachelor's degree have the option to begin their graduate studies in sport management in their senior year. Students will apply for the accelerated program during their junior year. During their senior year, they will complete up to four courses that will count for both their undergraduate degree and their MSM degree. Following the completion of their undergraduate degree in their fourth year, the remainder of needed graduate courses will be taken during the fifth year.

Masters

Code	Title	Credits
Required Courses		**9**
HNES 614	Global Perspectives in Sport	
HNES 626	Foundations of Sport Management	
HNES 700	Research in Physical Education and Sport Coaching	
Electives		**21**
HNES 601	Principles of Intercollegiate Athletics Administration	
HNES 615	The Olympic Games and Mega-Sporting Events	
HNES 616	Foundations in African Sport	
HNES 617	Foundations in European Sport	
HNES 618	Foundations of Sport in Oceania	
HNES 619	Foundations in Asian Sport	
HNES 621	Foundations of Sport in the Americas	
HNES 625	Strategic Sport Marketing	
HNES 644	Sport Finance	
HNES 692	Global Practicum: Study Abroad	
HNES 704	Psychological Foundation of Sport & Physical Activity	
HNES 707	Sport and Society	
HNES 739	Sport Revenue Generation	

HNES 745	Intercollegiate Sport Leadership	
HNES 749	Governance in College Sport	
HNES 768	Socio-cultural and Ethical Issues in Intercollegiate Sport	
HNES 769	Human Resource Management In Sport	
HNES 771	Sport and the Media	
HNES 790	Graduate Seminar	
HNES 793	Individual Study	
HNES 794	Practicum/Internship	
Total Credits		**30**

Intercollegiate Athletics Administration Certificate

Code	Title	Credits
Required Courses		**6**
HNES 601	Principles of Intercollegiate Athletics Administration	
HNES 749	Governance in College Sport	
Electives		**9**
HNES 745	Intercollegiate Sport Leadership	
HNES 768	Socio-cultural and Ethical Issues in Intercollegiate Sport	
HNES 794	Practicum/Internship	
Total Credits		**15**

Statistics

Department Information

- **Department Chair:**
  Rhonda Magel, Ph.D.
- **Department Location:**
  Minard Hall 334
- **Department Email:**
  ndsu.stats@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/statistics/ (http://www.ndsu.edu/statistics/)
- **Application Deadline:**
  Application deadline is March 15 for international students and applicants who would like an opportunity for an assistantship if available.
- **Credential Offered:**
  Ph.D., M.S., Certificate
- **Test Requirement:**
  GRE (recommended)
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

The Department of Statistics offers programs leading to a Doctor of Philosophy (Ph.D.) in Statistics, a Master of Science (M.S.) degree in Applied Statistics, and certificates in Statistics (for non-majors) and Big Data Applied Statistics Analysis. The program is flexible enough create a plan based on individual prior experience and in accord with professional goals.

During the first year of the program, master's and doctoral students are strongly encouraged to meet with each faculty member to discuss possible research topics. The student should select a supervisory committee by the end of the first year.

Graduate certificates in Statistics for non-majors and Big Data Applied Statistics Analysis are also available.

Graduate Certificates

- B.S. or equivalent degree from an accredited university,
- Knowledge of College Algebra

Master's Program in Applied Statistics

In addition to the Graduate College requirements (p. 25), 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

Ph.D. Program in Statistics

In addition to the Graduate College 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 College 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 College no later than March 15.

Statistics Certificate (for non-majors)

- Students hoping to earn the certificate must take 12 semester credit hours consisting of graduate level courses in statistics.
  - STAT 725 Applied Statistics 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.
  - Statistics courses numbered 700-724 do not count towards this degree.
  - Students in the certificate program cannot receive credit for both STAT 661 Applied Regression Models and STAT 726 Applied Regression and Analysis of Variance STAT 726 is recommended.
  - Students in this program cannot receive credit for both STAT 670 Statistical SAS Programming and STAT 671 Introduction to the R Language.
- Students need to apply to the graduate certificate program (https://catalog.ndsu.edu/graduate/admission-information/#:~:text=of%20academic%20performance-,Application%20Requirements,-All%20degree%20and) in Statistics at least one semester prior to completion.
- After completing the requirements for the certificate, please contact the Department of Statistics to verify completion.

Big Data Applied Statistics Analysis Certificate

This certificate serves graduate students and working professionals by providing summer online coursework in Big Data Applied Statistics Analysis. Analytics professionals are in demand in this era of big data. Students will learn how to visualize and use statistical learning algorithms to explore big data.

Code	Title	Credits
STAT 712	Applied Statistical Machine Learning	3
STAT 711	Basic Computational Statistics using R	3
STAT 713	Introduction to Data Science	3
STAT 714	Statistical Big Data Visualization	3
Total Credits		**12**

Master of Science in Applied Statistics

The program for the M.S. degree in applied statistics requires 32 semester credits with an overall GPA of 3.0 or higher. An oral defense of a research-based thesis or paper is required.

Code	Title	Credits
Complete a set of core courses* with a grade of B or better, including		**15**
STAT 661	Applied Regression Models	

STAT 662	Introduction to Experimental Design	
STAT 764	Multivariate Methods	
or STAT 874	Generalized Linear Models	
STAT 767	Probability and Mathematical Statistics I	
STAT 768	Probability and Mathematical Statistics II	
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 886	Advanced Inference	
STAT 796	Special Topics	
STAT 851	Bayesian Statistical Inference	
STAT 859		
Research (Master's Paper 2-4 credits; Master's Thesis 6-10 credits)		
STAT 798	Master's Thesis	
or STAT 797	Master's Paper	
Must have 15 hours of 700-800 level courses.		

*If one of these courses has been taken at the undergraduate level, another graduate level course should be substituted. STAT 725 Applied Statistics and STAT 726 Applied Regression and Analysis of Variance will not be counted for this degree program.

- A plan of study must be submitted at least one semester prior to graduation.
- Pass a written comprehensive exam. This exam consists of two sections. Exam 1 covers STAT 767 Probability and Mathematical Statistics I and STAT 768 Probability and Mathematical Statistics II. Exam 2 covers STAT 661 Applied Regression Models, STAT 662 Introduction to Experimental Design and STAT 764 Multivariate Methods or STAT 874 Generalized Linear Models. Exam 1 is two hours and Exam 2 is three hours. These exams are offered during approximately the fifth week of each semester. A maximum of two attempts is allowed.
- Complete and successfully defend the research thesis or paper.

Ph.D. Degree in Statistics

The Ph.D. degree requires an additional 30 credits of course work and 30 hours in research beyond the M.S. degree.

All students must:

1. Complete a set of core courses with a grade of B or better including STAT 661, 662, 767, 768, and 764 or 774. Most of these courses will be completed during your M.S. degree. Without permission, a maximum of two of the courses can be used to count on your plan of study.
2. Complete an additional 30 semester credits of statistics courses at the 600- to 800-level (does not include STAT 711, 712, 713, 714, 725 or 726). At least 15 credits must be at the 700- to 800- level.
3. Students must take STAT 786, STAT 764, and STAT 774 if not taken at the M.S. level.
4. Upon approval by the adviser and supervisory 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 750 Analysis.
5. 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 (fall and spring). A maximum of two attempts is allowed.

6. STAT 899 research credits can not be taken during the first two semester in the graduate program at NDSU. Summer does not count as a semester.
7. Submit your Plan of Study to the Graduate College at least one month prior to your oral preliminary examination, per Graduate College policy.
8. Submit a research proposal and pass an oral exam on the proposal and related topics at least one semester prior to defending your dissertation.
9. Complete and successfully defend the research dissertation.

*Some of these requirements may be satisfied upon admittance into the program with an already existing M.S. degree in Statistics.

Code	Title	Credits
Core Courses		
STAT 661	Applied Regression Models	3
STAT 662	Introduction to Experimental Design	3
STAT 764	Multivariate Methods	3
or STAT 874	Generalized Linear Models	
STAT 767	Probability and Mathematical Statistics I	3
STAT 768	Probability and Mathematical Statistics II	3
Additional statistics courses, not including STAT 725 or STAT 726		30
If not taken at the M.S. level, student must take STAT 764, STAT 774, STAT 786.		
STAT 899	Doctoral Dissertation	
Total		**60**

Bong-Jin Choi, Ph.D.
University of South Florida, 2014
Field: Computational Statistics, Machine Learning, Biostatistics, Public Health Research, Big Data Analysis

Ron Degges, Ph.D.
North Dakota State University, 2011
Field: Sampling, Regression Analysis

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

Mingao Yuan, Ph.D.
Indiana University-Purdue University, 2018
Field: Network Analysis, Big Data Analysis, Statistical Machine Learning

Student Affairs Administration

Department Information

- **School of Education Head:**
  Chris Ray, Ph.D.
- **Program Coordinator:**
  Laura Parson, Ph.D.
- **Email:**
  laura.parson@ndsu.edu
- **Department Location:**
  School of Education, FLC 210
- **Department Phone:**
  (701) 231-7101
- **Department Web Site:**

www.ndsu.edu/edol/degree_programs/graduate_certificates/graduate_certificate_in_student_affairs_administration/ (http://www.ndsu.edu/edol/degree_programs/graduate_certificates/graduate_certificate_in_student_affairs_administration/)

- **Application Deadline:**
  July 1 - fall admission; December 31 - spring admission
- **Credential Offered:**
  Graduate Certificate

The Graduate Certificate in Student Affairs Administration is designed to prepare professionals who work in higher education settings with the foundations of practice, research, and theory related to working with diverse populations of college and university students.

This program will enhance knowledge and skills in:

- Foundations of student affairs
- Enrollment management and student retention
- College student development theory
- Campus environments
- Career counseling

The program is open to everyone with a baccalaureate degree who is interested in working with college students, including faculty, staff, and administrators at NDSU and the surrounding colleges and universities. Current graduate students can also add this certificate to their plan of study.

Admission Requirements

To be admitted to the Student Affairs Administration Certificate program, the applicant must:

- Submit a letter of support from their supervisor (if applicable) as well as a one page statement of intent
- Hold a baccalaureate degree from an educational institution of recognized standing
- Have earned a cumulative grade point average (GPA) of at least 3.0 on a 4.0 scale in all courses at the baccalaureate level

Certificate Requirements

The program of study requires four courses (12 credit hours), which may be taken in any order.

Code	Title	Credits
EDUC 704	Collegiate Environments	3
EDUC 706	Theories of College Student Development	3
EDUC 708	Higher Education Student Affairs and Enrollment Management	3
CNED 714	Career Counseling and Testing	3
Total Credits		**12**

Supply Chain Management

Department Information

- **Department Chair:**
  Joseph Szmerekovsky, Ph.D.
- **Program Coordinator:**
  Elizabeth Worth
- **Email:**
  elizabeth.worth@ndsu.edu
- **Department Location:**
  Barry Hall/Quentin Burdick Building
- **Department Phone:**
  (701) 231-6038
- **Department Web Site:**
  www.ndsu.edu/business/programs/graduate/mscm/ (http://www.ndsu.edu/business/programs/graduate/mscm/)
- **Application Deadline:**
  See Admission Requirements
- **Credential Offered:**
  M.S.C.M., Certificate - All programs offered online only

- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6; Duolingo 105

The Department of Transportation, Logistics, and Finance offers an online master's degree in Supply Chain Management (MSCM) and an online graduate certificate in Enterprise Resource Planning (ERP). The degree/certificate is awarded through the College of Business in collaboration with the Upper Great Plains Transportation Institute. The MSCM and ERP programs take an interdisciplinary approach to supply chain, logistics and transportation to attract students with a multitude of backgrounds.

These programs target aspiring supply chain professionals, industry professionals, military officers and Department of Defense civilians who want to meet all the supply chain challenges of the 21st century. A wide range of career opportunities exists in the supply chain industry, including supply chain manager, logistics manager, warehouse/distribution manager, business process improvement analyst, and many more.

Curriculum Focus

The uniqueness of the MSCM and ERP programs are reflected in its curriculum focus, which is a direct derivative of the private industry needs and Army's National Logistics Curriculum. The following focus areas define a framework for expected outcomes and curricula:

- integrated supply chain management
- procurement, sourcing, and financial planning of the supply chain
- supply chain optimization and planning
- global supply chain management
- technology enablers for supply chain
- change management and leadership
- enterprise resource planning including hands-on SAP training and data analytics
- remote sensing and adaptive logistics planning
- transportation analysis and planning for logistics
- emergency management

Master of Supply Chain Management (MSCM)

The MSCM is a non-thesis degree. Students will participate in a multitude of interdisciplinary courses that will enhance and develop their supply chain skills, research abilities, and their capacity to apply them in real world situations.

Certificate in Enterprise Resource Planning (ERP)

SAP is the leading global provider of ERP software. More than 200,000 organizations around the world use SAP software to streamline the management of their business processes. More than 80% of Fortune 1000 companies use SAP to integrate their business activities. To best use their SAP solutions, organizations need people with ERP knowledge and skill to drive business processes effectively and efficiently.

The MSCM program offers three courses in SAP that will give you the skills needed to be a leader in the next generation of digital enterprise. These graduate-level courses include up to 50 hours of hands-on experience learning enterprise resource integration of supply chain processes such as procurement, material management, production, distribution and fulfillment.

North Dakota State University is a member of the SAP University Alliances, which allows our students to learn by having access to SAP data to manipulate and experience real world situations.

Admission Requirements

Both the Master of Supply Chain Management (MSCM) and the Certificate in Enterprise Resource Planning (ERP) are open to qualified graduates of universities and colleges of recognized standing. To be admitted with full standing, the applicant must:

1. Hold a baccalaureate degree from an educational institution of recognized learning with a minimum grade point average (GPA) of 3.0 or equivalent. For those with GPAs of 2.99 or less, the applicant should consider submitting a GMAT/GRE score to be considered for acceptance.
2. Have shown the potential to undertake advanced study as evidenced by prior academic performance and has stated interest in logistics.
3. Submit official transcripts
4. Submit a two-page resume
5. Submit a one-page "Letter of Intent" outlining their reasons for pursuing the degree/certificate
6. Submit three letters of recommendation (NA for certificate option)
7. Submit online application through the NDSU Graduate School website

8. International applicants whose first language is not English and who do not possess a U.S. bachelor's degree or higher are subject to additional requirements when they apply for admission. They must meet the minimum requirements on measures of general English language proficiency. The accepted measures of language proficiency are the TOEFL ibT 71 and IELTS 6.

Students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but show satisfactory potential for graduate study, may be admitted conditionally. The conditional status may be changed to full graduate standing after the first or second semester of study, based on the student's academic performance.

Apply for Admission

To apply for admission, please visit the Admission Information page (https://catalog.ndsu.edu/graduate/admission-information/).

Application Deadlines

Domestic Applicants	International Applicants
July 1 - Fall	**May 1 - Fall**
December 1 - Spring	**October 1 - Spring**
April 1 - Summer	**March 1 - Summer**

Degree Requirements

Master of Supply Chain Management (MSCM)

A minimum of 30 credits is required for the MSCM and must be completed using the combination of core courses and elective courses as listed below. An overall GPA of 3.0 or higher must be maintained to remain in good academic standing.

Certificate in Enterprise Resource Planning (ERP)

The certificate in ERP will consist of TL 715, TL 725, and TL 735. More information can be found in the course list below.

Code	Title	Credits
Core Courses (15 credits)		**15**
TL 711	Integrated Supply Chain System	3
TL 721	Global Supply Chain Management	3
TL 731	Supply Chain Decision Analysis	3
TL 757	Technologies for Supply Chain Transport Solutions	3
TL 787	Transportation and Distribution	3
Elective Courses (15 credits) from those listed below		**15**
(Students completing TL 715, TL 725, TL 735 elective courses are eligible to receive an ERP Certificate)		
TL 715	Introduction to ERP	3
TL 725	ERP Configuration	3
TL 735	Practical Data Analytics	3
MGMT 727	Organizational Change Management	3
TL 751	Supply Chain Transport Security	3
TL 789	Managerial Leadership for Supply Chain Professionals	3
SCM 625	Procurement & Sourcing	3
SCM 653	Financing the Supply Chain	3

Faculty

Raj Bridgelall, Ph.D.
North Dakota State University, 2015
Research Interests: Big Data Analytics, Internet-of-Things (IoT), Cloud Computing; Connected and Autonomous Vehicles (CAV), Shared Mobility, Intelligent Transportation Solutions; Signal Processing and Mathematical Modeling of Transportation Systems; Remote Sensing with Unmanned Aircraft Systems; Hyperspectral Image Analysis; Radio Frequency Identification (RFID); Real-Time Locating Systems (RTLS); Energy Harvesting and Massive Scale Autonomous Wireless Sensor Networks
Department: Transportation, Logistics, and Finance

Robert Froberg, Ph.D.

North Dakota State University, 2019
Research Interests: Transport of Rolling Stock, Equipment, and Supplies to Austere Locations, Austere Environment Sustainment Planning, Transportation Analysis and Planning for Logistics, Supply Chain Planning, Assessment, and Optimization Leveraging (Big) Data, Modeling of Supply Chains and Transportation Networks
Department: Transportation, Logistics, and Finance

Ranjit Godavarthy, Ph.D.
Kansas State University, 2012
Research Interests: Public Transportation in Small Urban and Rural Areas, Demand Response Transit and Paratransit, Bike Share, Roundabouts, Traffic Engineering and Operations, Transportation and Highway Safety
Department: Transportation, Logistics, and Finance

Pan Lu, Ph.D.
North Dakota State University, 2011
Research Interests: Connected and Autonomous Vehicles, Smart Material and Structure Health Monitoring, Big Data Analytics for Transportation, Smart Transportation, Transportation System, Asset Management, Multimodal Transportation, Geospatial Transportation Modeling
Department: Transportation, Logistics, and Finance

Jeremy Mattson, Ph.D.
North Dakota State University, 2017
Research Interests: Public Transportation, Transportation Economics, Demand Modeling, Travel Behavior, Built Environment
Department: Transportation, Logistics, and Finance

Diomo Motuba, Ph.D.
North Dakota State University, 2009
Research Interests: Transportation and Land Use Planning, Freight Modeling, Transportation Economics, Connected Automated Vehicles, Logistics and Supply Chain Management, Transportation Safety
Department: Transportation, Logistics, and Finance

Tim O. Peterson, Ph.D.
Texas A&M University, 1988
Research Interests: Managerial Leadership, Application of Information Technology to Organizational Issues, Scholarship of Teaching
Department: Management and Marketing

Fred Riggins, Ph.D.
Carnegie Mellon University, 1994
Research Interests: Economics of Information Systems, Interorganization Systems, Adoption of New Technology, Radio Frequency Identification (RFID), Internet-of-Things (IoT), Blockchain, Cryptoeconomics, Information and Communication Technology in Microfinance
Department: Accounting and Information Systems

Robert Swearingen, Ph.D.
North Dakota State University, 2019
Research Interests: Change Management in Supply Chain Organizations, Lean Inventory Management Process Improvement Supported by Value Stream Mapping, Enterprise Information Systems Supporting Supply Chain Management
Department: Transportation, Logistics, and Finance

Joseph Szmerekovsky, Ph.D.
Case Western Reserve University, 2003
Research Interests: Project Management and Scheduling, Supply Chain Management and Technology, Energy Supply Chain Management, Healthcare Logistics
Department: Transportation, Logistics, and Finance

Denver Tolliver, Ph.D.
Virginia Polytechnic Institute and State University, 1989
Research Interests: Highway Systems Modeling, Multimodal Transportation Planning, Freight Transportation, Energy and Environmental Analysis
Department: Transportation, Logistics, and Finance

Transportation & Supply Chain

Department Information

- **Department Chair:**
  Tim Peterson, Ph.D.
- **Program Coordinator:**

Elizabeth Worth
- **Email:**
elizabeth.worth@ndsu.edu
- **Department Location:**
Barry Hall/Quentin Burdick Building
- **Department Phone:**
(701) 231-6038
- **Department Web Site:**
www.ndsu.edu/business/programs/graduate/phd/ (http://www.ndsu.edu/business/programs/graduate/phd/)
- **Application Deadline:**
See Admission Requirements
- **Credential Offered:**
Ph.D.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

The Department of Transportation, Logistics, and Finance offers a Ph.D. degree in Transportation and Supply Chain. The degree is awarded through the College of Business in collaboration with the Upper Great Plains Transportation Institute. The program takes an interdisciplinary approach to transportation and supply chain and attracts students with backgrounds in supply chain management, transportation, agribusiness, applied economics, civil engineering, construction management, emergency management, finance, geosciences, and industrial/manufacturing engineering.

Admission Requirements

The Transportation and Supply Chain Ph.D. program is open to qualified graduates of universities and colleges of recognized standing. To be admitted with full standing, the applicant must:

1. Hold a master's degree (preferred) from an educational institution of recognized learning, baccalaureate degree a minimum.
2. Have adequate preparation in one or more of the disciplines comprising transportation and supply chain.
3. Have shown the potential to undertake advanced study and research as evidenced by prior academic performance
4. Have earned a cumulative grade point average of at least 3.0 or equivalent in all courses completed at the highest education level reached
5. Submit a NDSU Graduate College application consisting of the application, statement of purpose, official transcripts, letters of reference, and English proficiency scores (if applicable). Additional documents that may be submitted could include resume and professional vita. Applications for admission will be submitted via the Graduate College website. Applicants must meet all application requirements of the graduate school and department before being considered for acceptance

- For acceptance into a Fall semester, international applications are due December 1.
- Domestic applications will be reviewed as they are received, and admitted students may be able to enroll in an earlier semester than the above deadlines.
- Students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but show satisfactory potential for graduate study, may be admitted conditionally. The conditional status may be changed to full graduate standing after the first or second semester of study, based on the student's academic performance.

Apply for Admission

To apply for admission, please visit the Admission Information page (https://catalog.ndsu.edu/graduate/admission-information/).

Financial Assistance

The number of assistantships vary from year to year, depending on grant availability and the number of students in residence. Applicants are considered on the basis of merit and potential to undertake advanced study and research. To be considered for an assistantship, an applicant must complete a Graduate College application, be accepted by the department, and identify the desire for an assistantship or financial need in the statement of purpose.

In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

Degree Requirements

The Ph.D. program requires the completion of a minimum of 90 credits of graduate study beyond the baccalaureate degree. Thirty credits will be automatically considered completed if the student completed one of the master's degree from the TLF Department. If the student already has a master's degree in a related discipline, the student is eligible to transfer a maximum of 30 credits from the master's degree towards the 90 credits. The credits are required to consist of the following:

- 18 credits of core Transportation & Logistics courses.
- 3 credits of required graduate teaching experience course.
- Out of 9 elective course credits needed, a minimum of 6 credits must be transportation and logistics elective courses.
- A minimum of 30 credits of research-based dissertation credits.

Each student must develop a plan of study under the guidance of a faculty adviser and a supervisory committee. Students must take a total of three different examinations to successfully complete their Ph.D. degree in Transportation and Logistics: 1) the qualifying examination, 2) the proposal defense examination, and 3) the dissertation defense examination. The qualifying examination is a written examination that will be required of each student after the qualifying courses have been completed. After passing the qualifying examination, the student will be formally admitted to candidacy for the Doctor of Philosophy degree. Students who pass the qualifying examination are expected to take the proposal defense examination by the end of their third year in the program. For the proposal defense and dissertation defense examinations, the supervisory committee shall serve as the examining committee and the major advisor shall serve as chair. The proposal defense examination is an oral exam and is concerned primarily with the student's detailed research proposal for the dissertation. Upon completion of the proposal defense examination, a student will be considered a doctoral candidate. The dissertation defense will be taken after the candidate has completed the course work and proposal defense examination. The dissertation defense examination, which is an oral examination, will be concerned primarily with the dissertation; but it may also cover material from course work, especially those courses fundamental to the dissertation. The Ph.D. program requires students to present at least one original transportation and/or logistics research paper at a national or international conference, and submit at least one paper to a referred journal.

Code	Title	Credits
Core Courses		**18**
TL 823	Seminar in Supply Chain Research	3
TL 831	Supply Chain Modeling Algorithms and Decision Analysis	3
TL 881	Human Wellbeing through Transportation	3
TL 882	Transportation Systems	3
TL 885	Spatial Analysis in Transportation & Supply Chain	3
TL 888	Research Methods	3
Required Courses		
TL 892	Graduate Teaching Experience	2
Transportation and Logistics (TL) Elective Courses		**4 or more courses**
TL 711	Integrated Supply Chain System	3
TL 715	Introduction to ERP	3
TL 721	Global Supply Chain Management	3
TL 725	ERP Configuration	3
TL 731	Supply Chain Decision Analysis	3
TL 735	Practical Data Analytics	3
TL 751	Supply Chain Transport Security	3
TL 757	Technologies for Supply Chain Transport Solutions	3
TL 787	Transportation and Distribution	3
TL 789	Managerial Leadership for Supply Chain Professionals	3
Dissertation		**30 or more**
TL 899	Doctoral Dissertation	

Faculty

Raj Bridgelall, Ph.D.
North Dakota State University, 2015

Research Interests: Big Data Analytics, Internet-of-Things (IoT), Cloud Computing; Connected and Autonomous Vehicles (CAV), Shared Mobility, Intelligent Transportation Solutions; Signal Processing and Mathematical Modeling of Transportation Systems; Remote Sensing with Unmanned Aircraft Systems; Hyperspectral Image Analysis; Radio Frequency Identification (RFID); Real-Time Locating Systems (RTLS); Energy Harvesting and Massive Scale Autonomous Wireless Sensor Networks
Department: Transportation, Logistics, and Finance

Robert Froberg, Ph.D.
North Dakota State University, 2019
Research Interests: Transport of Rolling Stock, Equipment, and Supplies to Austere Locations, Austere Environment Sustainment Planning, Transportation Analysis and Planning for Logistics, Supply Chain Planning, Assessment, and Optimization Leveraging (Big) Data, Modeling of Supply Chains and Transportation Networks
Department: Transportation, Logistics, and Finance

Ranjit Godavarthy, Ph.D.
Kansas State University, 2012
Research Interests: Public Transportation in Small Urban and Rural Areas, Demand Response Transit and Paratransit, Bike Share, Roundabouts, Traffic Engineering and Operations, Transportation and Highway Safety
Department: Transportation, Logistics, and Finance

Pan Lu, Ph.D.
North Dakota State University, 2011
Research Interests: Connected and Autonomous Vehicles, Smart Material and Structure Health Monitoring, Big Data Analytics for Transportation, Smart Transportation, Transportation System, Asset Management, Multimodal Transportation, Geospatial Transportation Modeling
Department: Transportation, Logistics, and Finance

Jeremy Mattson, Ph.D.
North Dakota State University, 2017
Research Interests: Public Transportation, Transportation Economics, Demand Modeling, Travel Behavior, Built Environment
Department: Transportation, Logistics, and Finance

Diomo Motuba, Ph.D.
North Dakota State University, 2009
Research Interests: Transportation and Land Use Planning, Freight Modeling, Transportation Economics, Connected Automated Vehicles, Logistics and Supply Chain Management, Transportation Safety
Department: Transportation, Logistics, and Finance

Tim O. Peterson, Ph.D.
Texas A&M University, 1988
Research Interests: Managerial Leadership, Application of Information Technology to Organizational Issues, Scholarship of Teaching
Department: Management and Marketing

Fred Riggins, Ph.D.
Carnegie Mellon University, 1994
Research Interests: Economics of Information Systems, Interorganization Systems, Adoption of New Technology, Radio Frequency Identification (RFID), Internet-of-Things (IoT), Blockchain, Cryptoeconomics, Information and Communication Technology in Microfinance
Department: Accounting and Information Systems

Robert Swearingen, Ph.D.
North Dakota State University, 2019
Research Interests: Change Management in Supply Chain Organizations, Lean Inventory Management Process Improvement Supported by Value Stream Mapping, Enterprise Information Systems Supporting Supply Chain Management
Department: Transportation, Logistics, and Finance

Joseph Szmerekovsky, Ph.D.
Case Western Reserve University, 2003
Research Interests: Project Management and Scheduling, Supply Chain Management and Technology, Energy Supply Chain Management, Healthcare Logistics
Department: Transportation, Logistics, and Finance

Denver Tolliver, Ph.D.
Virginia Polytechnic Institute and State University, 1989
Research Interests: Highway Systems Modeling, Multimodal Transportation Planning, Freight Transportation, Energy and Environmental Analysis
Department: Transportation, Logistics, and Finance

Women and Gender Studies

Department Information

- **Program Director:**
  Ashley Baggett, Ph.D.
- **Department Web Site:**
  www.ndsu.edu/wgs/graduate_certificate_in_women_and_gender_studies/ (http://www.ndsu.edu/wgs/graduate_certificate_in_women_and_gender_studies/)
- **Application Deadline:**
  Rolling admission

The North Dakota State University (NDSU) Women and Gender Studies (WGS) program is an interdisciplinary academic program that focuses on women and gender issues in society, while integrating the teaching, research, and service goals of our land grant university. The program offers a graduate certificate in Women and Gender Studies that is open to students enrolled in graduate degree programs at NDSU as well as professionals who are not currently pursuing a masters or doctorate.

To begin your certificate studies in the WGS program, contact the Director, Dr. Ashley Baggett, at ashley.baggett@ndsu.edu.

Career Opportunities (https://www.ndsu.edu/wgs/undergraduate_major_and_minor/major_and_minor/)

Graduate students completing the Women and Gender Studies certificate enrich the study of their discipline by receiving additional instruction in the way in which gender and sexuality functions. The perspectives and application of feminist theory deeps research in their respective field.

Increasingly, employers seek candidates who understand and support diversity and inclusiveness, which is a foundational principle in the Women and Gender Studies program. The Women and Gender Studies certificate provides the valuable expertise to advance professionals in the workplace. Educators can gain graduate credit hours necessary to increase their salary. Doctoral scholars improve their marketability by demonstrating versatility in their research and are eligible to seek positions with dual appointments in their home field and in Women and Gender Studies.

The Curriculum (https://www.ndsu.edu/wgs/graduate_certificate_in_women_and_gender_studies/)

Women and Gender Studies certificate students complete 5 credit hours in core courses. These include WGS 793: Professional Development, WGS 797S: Research, and WGS 793: Community Outreach. The Professional Development credit hour is an independent study for engagement with the field through activities such as conference presentations or event organizing. The Research credit hour is for the development of an original research paper on a gender-related topic. Lastly, the Community Outreach independent study is the capstone. As a field committed to fostering justice for all, students complete a capstone that places feminist theory into practice.

In addition to the core courses, Women and Gender Studies certificate students explore issues of gender and sexuality through completion of 9 elective credits. These are tailored towards their individual field and include Education, Sociology, Public Health, History, and others.

To be admitted to the WGS Certificate Program, the applicant must be a current degree-seeking student in a graduate program at an educational institution of recognized standing, with a 3.0 GPA or higher. Submit a short statement of purpose (no more than two double-spaced pages) indicating 1) reasons for pursuing a graduate certificate in WGS, 2) the experiences you've had (e.g., informal, academic, professional, volunteer) that are related to this graduate certificate, and 3) your professional goals and how this graduate certificate program will help you accomplish those goals.

To apply, please go to the Admission Information page. Decisions will be made on an ongoing, rolling basis.

Course requirements for the graduate certificate in WGS will build upon existing graduate curriculum, most of which are accessible to all disciplines. This program requires 9 credit hours of coursework (may be combined with coursework for your primary degree program); 1 credit hour of professional development; a research component worth 1 credit hour; and a community project or grant application worth 3 credit hours, for a total of 14 credit hours.

Current List of Graduate Courses that are suggested by WGS (list is not all-inclusive, and some programs are restricted to their enrolled students):

Code	Title	Credits
Required Courses		
WGS 795: Practicum/Professional Development		1
WGS 796: Special Topics/Research		1
WGS 797S: Comprehensive Project/Capstone		3
Graded Coursework		

Social/Cultural Development - Select one class from the following:		3
EDUC 712	Social, Cultural and Political Dimensions of Schools	
ENGL 656	Literacy, Culture and Identity	
HDFS 813	Social and Emotional Development Across the Lifespan	
SOC 610	Social Inequality	
SOC 612	Sociology of Gender	
Tools for Making Change - Select one class from the following:		3
EDUC 730	Leadership, Planning and Organizational Behavior	
EDUC 808	Empowerment & Transformative Education	
PH 704	Public Health Management and Policy	
SOC 624	Feminist Theory and Discourse	
MGMT 630	Leadership in Organization	
Open Elective - Select one from the following:		3
CJ 665	Gender, Race and Ethnicity in Criminal Justice	
ENGL 654	Language Bias	
HIST 626	Women in American History	
HDFS 714	Contemporary Youth Issues	
SOC 617	Sociology Of The Family	
Total Credits		**14**

Ashley Baggett, Ph.D.
Associate Professor and Director of WGS
Louisiana State University, 2014
Research Interests: Women's History/Gender Studies, 19th Century U.S., Southern History

Alison Bertolini, Ph.D.
Associate Professor, English and Women and Gender Studies
Louisiana State University, 2009
Research Interests: Contemporary American Literature, Gender Studies, Ethnic Literature, Postcolonial Literature, Women's Studies

Dena Wyum, M.S.
Lecturer, Human Development and Family Science
North Dakota State University, 2008

Allied Faculty

Kelly Cameron, Ph.D.
Senior Lecturer, English
Texas Christian University, 2012
Research Interests: Feminist Approaches to Rhetoric and Cultural Rhetorics

Kristen Fellows, Ph.D.
Assistant Professor, Sociology and Anthropology
University of Pennsylvania, 2013
Research Interests: Feminist Archaeology and Anthropology, Ethnohistory and Oral Histories

Holly Hassel, Ph.D.
Professor, English
University of Nebraska, 2002
Research Interests: Feminist Pedagogy

Christi McGeorge, Ph.D.
Professor, Human Development and Family Science
University of Minnesota, 2005
Research Interests: Influence of Heterosexism and Homophobia on Clinical Practice and Training, Gender Equity in Therapy, Gender Equity in Higher Education

Carrie Anne Platt, Ph.D.
Associate Professor, Communication
University of Southern California, 2008

Research interests: Rhetorical Approaches to Emerging Technologies and Identity in Public Culture As Well as Digital Media and Communication Pedagogy

Christina Weber, Ph.D.
Associate Professor, Sociology and Anthropology
State University of New York (Buffalo), 2005
Research Interests: The Sociology of Memory and Trauma, Photography's Impact of the Historical Understanding of the Great Depression, Women and the Dust Bowl

Youth Development

Department Information

- **Department Head:**
  Joel Hektner, Ph.D.
- **Department Location:**
  Evelyn Morrow Lebedeff Hall
- **Department Phone:**
  (701) 231-8268
- **Department Web Site:**
  www.ndsu.edu/hdfs/academics/masters_degree/ (http://www.ndsu.edu/hdfs/academics/masters_degree/)
- **Credential Offered:**
  Graduate Certificate

The IDEA youth development program has its roots in Positive Youth Development. Rather than focusing solely on corrective measures, a Positive Youth Development approach equips young people in the second decade of life with the skills and opportunities necessary for successful transition into adulthood. This approach promotes positive outcomes for all youth by recognizing their strengths, fostering positive relationships, and providing youth with opportunities to learn, lead, connect and serve.

Certificates are available in Youth Development or Youth Program Management & Evaluation. A graduate certificate can complement a master's degree in a related field such as education, social work, or other human services, or provide working professionals with additional skills needed to advance their career.

Curriculum

Youth Development

Code	Title	Credits
HDFS 710	Foundations of Youth Development	3
HDFS 711	Youth Development	3
Select 2 courses from the following:		6
HDFS 712	Positive Youth Development in Community Settings	
HDFS 713	Adolescents and Their Families	
HDFS 714	Contemporary Youth Issues [1]	
HDFS 715	Youth Culture	
HDFS 719	Youth Policy	
HDFS 730	Youth-Adult Relationships	
HDFS 790	Graduate Seminar [1]	
Total Credits		**12**

1

With approval of topic by advisor.

Youth Program Management & Evaluation

Code	Title	Credits
HDFS 710	Foundations of Youth Development	3
HDFS 717	Design and Evaluation of Youth Programs	3
HDFS 718	Youth Development Personnel and Program Management	3

Select one course from the following:		3
HDFS 712	Positive Youth Development in Community Settings	
HDFS 714	Contemporary Youth Issues [1]	
HDFS 719	Youth Policy	
HDFS 790	Graduate Seminar [1]	
Total Credits		**12**

1

With approval of topic by advisor.

Course Definitions and Format

Courses approved at the time of publication are listed in this catalog. Not all courses are offered every term; students should refer to the semester scheduling tool, Schedule Planner, or schedule information in the student information system, Campus Connection. Credit in a course cannot be earned twice by repeating a course unless the course description indicates otherwise with "May be repeated".

Definitions

A course description serves to provide an overview of the key content to be covered in the course and the knowledge to be learned. Course descriptions also include additional information about enrollment, such as pre- 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: Course credits are stated in semester units as defined in the academic policies section in this bulletin.

Course prerequisites (Prereq): A prerequisite is a course that is necessary to be completed before a student can enroll in the course.

Course co-requisites (Coreq): A co-requisite is a course that a student must take concurrently with another course. Co-requisite courses must be enrolled in at the same time and both courses must be dropped if the student discontinues enrollment in one.

Other requisites: Other requirements considered necessary for enrollment in a course, such as being admitted into a specific major, meeting a minimum credit total (classification), or earning a specific grade in a prereq course.

Cross-listed courses: Cross-listed courses are the same course offered by two or more departments under different prefixes. Cross-listed courses have a different prefix, but the course number, title, credits, course description, requisites and learning outcomes are the same. Each course is identified under the corresponding prefix in catalog course descriptions. The course exists under each prefix in the student information system for scheduling by each departments, but the course exists as a singular course in the CourseLeaf module for course editing. Credit may only be earned for the course under one prefix. The Repeated Courses (https://catalog.ndsu.edu/academic-policies/repeated-courses/) policy applies if a student should attempt to retake the class under a different prefix following the first graded attempt.

Dual-listed courses: Dual-listed courses is one course is numbered at the 400-level (undergraduate) and the other course is numbered at the 600-level (graduate) and they have the same course prefix, title, credits, course descriptions, and requisites. While the same amount of credit for the course is earned by all students, there is additional work expected of the student enrolled in the 600-level course to meet the advanced course learning outcomes. 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. 1020). 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.

Course Numbers

Course numbers indicate the student classification for which the course is primarily intended. Some course numbers end with a letter suffix: L - laboratory course; R - recitation (undergraduate) or research continuation (graduate); S - graduate project. The number system is as follows:

- 0-99 series courses - developmental; non-degree eligible
- 100 series courses - primarily for freshmen
- 200 series courses - primarily for sophomores
- 300 series courses - primarily for juniors
- 400 series courses - primarily for seniors
- 500-599 series courses - post-baccalaureate professional courses
- 601-699 series courses - graduate courses taught concurrently in the same classroom with advanced undergraduates at the 400 or 500 level
- 700-799 series courses - open to graduate students
- 800-899 series courses - predominantly intended for doctoral level graduate students
- 2000 numbered courses - Continuing Education post-baccalaureate courses, not applicable toward graduate degrees

Uniform Course Numbers

The following courses may be offered by departments but are described here because of their uniform numbers and descriptions. If a grading basis is identified in the description below, no alternative grading basis may be requested. If no grading basis is identified in the description below, letter grades, P/F grades (undergraduate), or S/U grades (graduate) may be requested.

(Prefix) 179, 279, 379, 479, 679

Global Seminar, 1-6
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Prerequisite*:* Prior approval by the International Student and Study Abroad Services and major department. May be repeated.

(Prefix) 189
Skills for Academic Success, 1
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

(Prefix) 191, 291, 391, 491, 590, 690, 790, 890
Seminar, 1-5
A group of students engaged, under a professor or professors, in research or criticism and in presentation of reports pertaining thereto.

(Prefix) 292, 392, 492, 692
Global Practicum: Study Abroad, 1-15
Pre-arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange), or on approved study abroad programs. Prerequisite*:* Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (undergraduate) or 'S' or 'U' (graduate).

(Prefix) 193, 293, 393, 493
Undergraduate Research, 1-5
Student research, scholarly project or creative investigation completed under the guidance of a faculty mentor. Directed independent project, collaborative work or ongoing participation in faculty research should culminate in a presentation, article or scholarly project.

(Prefix) 194, 294, 394, 494
Individual Study, 1-5
Individual student work on research or criticism under the supervision of a professor.

(Prefix) 196, 296, 396, 496, 595, 695, 795, 895
Field Experience/Practicum, 1-15
Field-oriented supervised learning activities outside the college classroom that include a preplanned assessment of the experience, registration during the term the experience is conducted, and post evaluation with the instructor. Departmental approval.

(Prefix) 297, 397, 497, 897
Cooperative Education, 1-4
Practical application of classroom learning through employment in supervised career-related positions. Students are granted full-time student status by the University regardless of the actual credit hours. Requires departmental approval and Co-op Program application. Graded 'P' or 'F' (undergraduate) or 'S' or 'U' (graduate).

(Prefix) 199, 299, 399, 499, 596, 696, 796, 896
Special Topics, 1-5
A group study of the known and established literature of a field, or other evidence, for purposes of scholarly development.

(Prefix) 592
Case Studies, 1-3
Critical review, analysis, and evaluation of selected topics by individual presentations and group discussions. Case study topics are indicated by title on the student's transcript. Graded 'S' or 'U'.

(Prefix) 593, 793, 893
Individual Study/Tutorial, 1-5
Directed study allowing an individual student under faculty supervision to undertake selected, independent work in topics of special interest or a limited experience in research. Requires departmental approval.

(Prefix) 594, 794, 894
Internship, 1-8
Course designed to provide practical participation under professional supervision in selected situations to gain experience in the application of concepts, principles, and theories related to the student's area of specialization. Requires approved program and consent of instructor. Graded 'S' or 'U'.

(Prefix) 791, 891
Temporary/Trial Topics, 1-5
University-wide course focused on group study involving critical examination and discussion of subject matter selected for proposal as a temporary or trial course.

(Prefix) 792, 892
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. Prerequisite*:* Graduate standing.

(Prefix) 798
Master's Thesis, 1-10
Original investigation under the supervision of a major adviser and a supervisory committee. Graded 'S' or 'U'.

(Prefix) 798S
Specialist Field Study, 1-6

(Prefix) 799
Master's Examination, 1-6
Literature review, research, and preparation for the master's examination option.

(Prefix) 799S
Clinical Dissertation, 1-15
The clinical dissertation is a scholarly work that focuses on practice issues. It involves identification, development, implementation, and evaluation and/or dissemination of an evidence-based project addressing a current clinical issue. Graded 'S' or 'U'.

(Prefix) 898
Continuing Enrollment, 1-9
Intended for graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. The number of credits should be determined in consultation with the student's advisor and reflect both the proportion of time devoted by the student to academic study during the term and the student's enrollment status. Master's student may enroll in two fall/spring semesters of Continuing Enrollment. Doctoral students may enroll in up to four fall/spring semesters of Continuing Enrollment. Continuing Enrollment credits may be used to define the student's enrollment status (full-time, part-time, and for disquisition deposition) but do not count towards the requirements for the degree and are not financial aid eligible. The fee for Continuing Enrollment (898) is not eligible for a waiver. International Students must work with the International Student and Study Abroad Services office to ensure their eligibility before enrolling in these Continuing Enrollment credits. Graded 'S' or 'U'. Requires departmental approval.

(Prefix) 899
Doctoral Dissertation, 1-15
Original investigation under the supervision of a major adviser and an advisory committee. Graded 'S' or 'U'.

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Accounting (ACCT)

ACCT 102. Fundamentals of Accounting. 3 Credits.
Introduces financial statements and other accounting information to make personal and business decisions. Not available to majors and accounting minors in the College of Business Administration. Student may not have previously passed or be concurrently enrolled in ACCT 201.

ACCT 194. Individual Study. 1-3 Credits.

ACCT 196. Field Experience. 1-15 Credits.

ACCT 199. Special Topics. 1-5 Credits.

ACCT 200. Elements of Accounting I. 3 Credits.
An introduction to accounting to enable the student to achieve a working knowledge of accounting and its uses. ACCT 200 emphasizes the basic concepts and approaches of accounting applied to businesses, the accounting cycle, and the preparation of the income statement and balance sheet. Co-req: TL 116.

ACCT 201. Elements of Accounting II. 3 Credits.
Building on ACCT 200, ACCT 201 emphasizes the use of accounting information as a basis for decision-making. Topics include the statement of cash flows, financial statement analysis, and managerial accounting (budgeting, job-order costing, cost-volume-profit analysis, short-term decision making, and capital budgeting). Prereq: ACCT 200.

ACCT 291. Seminar. 1-3 Credits.

ACCT 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ACCT 294. Individual Study. 1-3 Credits.

ACCT 299. Special Topics. 1-5 Credits.

ACCT 311. Intermediate Accounting I. 4 Credits.
Intensive study of accounting theories, corporate accounting problems, financial statements and disclosures, problems in income determination, and other evolving issues in accounting. Prereq: ACCT 200 with a minimum grade of B. Restricted to College of Business 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 major or minor and a 2.50 minimum NDSU grade point average.

ACCT 318. Taxation in Management Decisions. 3 Credits.
Study of the fundamental concepts of tax implications that result from common business transactions. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. Prereq: ACCT 102 or ACCT 201.

ACCT 320. Cost Management Systems. 3 Credits.
Study of cost management methods used to assign costs, and plan and evaluate business activities. Prereq: ACCT 200 and ACCT 201 both with a grade of B or higher and students must be College of Business major or minor and have a 2.50 minimum NDSU grade point average.

ACCT 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ACCT 391. Seminar. 1-3 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

ACCT 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ACCT 394. Individual Study. 1-5 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

ACCT 397. Fe/Coop Ed/Internship. 1-4 Credits.

ACCT 399. Special Topics. 1-5 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

ACCT 410. Fraud Examination. 3 Credits.
Study of the pervasiveness and causes of fraud in society; examination of methods of fraud detection and prevention, and on the investigation of financial statement fraud. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. Prereq: ACCT 200 with a minimum grade of C. {Also offered for graduate credit - see ACCT 610.}.

ACCT 411. Advanced Fraud Examination via Data Analytics. 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. Prereq or Coreq: Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. Dual-listing: ACCT 611.

ACCT 413. Accounting Internship. 3 Credits.
Supervised professional experience in a non-paid position. May be repeated.

ACCT 415. Advanced Accounting. 3 Credits.
Study of advanced topics including consolidated statements, international operations, and derivative financial instruments. Prereq: ACCT 312 with a grade of C or better. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 615.}.

ACCT 418. Tax Accounting I. 3 Credits.
Study of the theory and principles related to the determination of taxable income and computation of federal income taxes for individuals. Prereq: A grade of C or better in ACCT 311 or FIN 410. Prereq or Coreq: Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. Dual-listing: 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 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 200 and ACCT 201 with a grade of B or better and MIS 320. Prereq or Coreq: Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. Dual-listing: 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 major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 621.}.

ACCT 425. Government and Not-For-Profit Accounting. 3 Credits.
Study of accounting standards and procedures applicable to government and not-for-profit institutions. Prereq: ACCT 311 with a grade of C or better. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 625.}.

ACCT 440. Management Control Systems. 3 Credits.
Study of the role of cost management analysts in the design, implementation, and use of management control systems. Prereq: ACCT 320. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 640.}.

ACCT 455. Advanced Projects using Excel. 3 Credits.
This course focuses on techniques, analytic methods, and advanced Excel skills to construct well-designed spreadsheets and visuals valuable for decision-making using a case-based method. Cases are accounting and business related and represent unstructured problems faced in industry. Prereq: B or higher in both ACCT 200 and ACCT 201 and students must be a College of Business major or minor and must have a 2.50 minimum NDSU grade point average.

ACCT 491. Seminar. 1-5 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

ACCT 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ACCT 494. Individual Study. 1-5 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

ACCT 496. Field Experience. 1-15 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

ACCT 499. Special Topics. 1-5 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

ACCT 595. Field Experience. 1-15 Credits.

ACCT 596. Special Topics. 1-5 Credits.

ACCT 610. Fraud Examination. 3 Credits.
Study of the pervasiveness and causes of fraud in society; examination of methods of fraud detection and prevention, and on the investigation of financial statement fraud. {Also offered for undergraduate credit - see ACCT 410.}.

ACCT 611. Advanced Fraud Examination via Data Analytics. 3 Credits.
Advanced application of fraud examination principles that encompass the investigation and prevention of fraudulent financial transactions. Coursework is focused on the analysis of fraudulent financial statements and fieldwork involving actual organizations. {Also offered for undergraduate credit - see ACCT 411.}.

ACCT 615. Advanced Accounting. 3 Credits.
Study of advanced topics including consolidated statements, international operations, and derivative financial instruments. {Also offered for undergraduate credit - see ACCT 415.}.

ACCT 618. Tax Accounting I. 3 Credits.
Study of the theory and principles related to the determination of taxable income and computation of federal income taxes for individuals. Students will prepare manual and computerized tax returns. {Also offered for undergraduate credit - see ACCT 418.}.

ACCT 619. Tax Accounting II. 3 Credits.
Study of the theory and principles related to the determination of taxable income and computation of federal income taxes for partnerships, corporations, trusts and estates, and other specialized tax issues. Prereq: ACCT 618. {Also offered for undergraduate credit - see ACCT 419.}.

ACCT 620. Accounting Information Systems. 3 Credits.
Study of conceptual and practical aspects of accounting information systems with a focus on business processes. Practical application includes use of software in a lab setting. {Also offered for graduate credit - see ACCT 420 .}.

ACCT 621. Auditing I. 3 Credits.
Study of audit principles and practices including evidence gathering, internal controls, sampling and testing, report writing, ethics and legal liabilities. {Also offered for undergraduate credit - see ACCT 421.}.

ACCT 625. Government and Not-for-Profit Accounting. 3 Credits.
Study of accounting standards and procedures applicable to government and not-for-profit institutions. {Also offered for undergraduate credit - see ACCT 425.}.

ACCT 640. Management Control Systems. 3 Credits.
Study of the role of cost management analysts in the design, implementation, and use of management control systems. {Also offered for undergraduate credit - see ACCT 440.}.

ACCT 695. Field Experience. 1-15 Credits.

ACCT 696. Special Topics. 5.00 Credits.

ACCT 700. Accounting for Decision Making. 3 Credits.
Acct 700 is a graduate course for students who do not have an undergraduate business degree. The course examines the basics of what accounting information is, how it is developed, how it is used, and what it means. Restrictions: Admittance to class by approval of the Master of Accountancy director.

ACCT 701. Financial Reporting I. 3 Credits.
In this class students will engage in an intensive study of corporate accounting problems, financial statements and disclosures, and other evolving issues in accounting. The emphasis is on the assets section of the balance sheet. Prereq: ACCT 700. Restrictions: Admittance to class by approval of the Master of Accountancy director.

ACCT 702. Financial Reporting II. 3 Credits.
In this class students will engage in an intensive study of accounting theories, corporate accounting problems, financial statements and disclosures, problems in income determination and other evolving issues in accounting. The emphasis is on the liabilities and stockholders' equity section of the balance sheet and special accounting issues such as revenue recognition and leasing. Prereq: ACCT 701. Restrictions: Admittance to class by approval of the Master of Accountancy director.

ACCT 722. Auditing II. 3 Credits.
Advanced application of audit principles in organizational situations through case studies and the investigation of current issues in auditing. Prereq: ACCT 621 and approval of the MAcc Program Director.

ACCT 725. International Financial Reporting Standards. 3 Credits.
Introduces the conceptual framework of International Financial Reporting Standards (IFRS) and compares the differences in accounting standards between U.S. GAAP and IFRS. Available to accounting major graduate students with intermediate accounting background.

ACCT 730. Legal Aspects of Business. 3 Credits.
This course will study law related to business in the areas of agency, accountant legal liability, business organizations, contracts, debtor-creditor relationships, government regulations of business transactions, real property, sales, and the Uniform Commercial Code.

ACCT 735. Applied Professional Research. 3 Credits.
This course will emphasize substantive accounting questions and issues that arise in practice. Professional research methods will be used to solve cases addressing these questions. Teamwork, communication skills, and analytical skills required of contemporary accounting practitioners will be developed.

ACCT 740. Advanced Topics in Management Accounting. 3 Credits.
This course is an advanced study of managerial accounting issues. Topics include strategy, control, budgeting, variance analysis, customer profitability, data analytics, advanced costing techniques, performance measures, and emerging issues. Prereq: Admission to the Master of Accountancy program, or permission of the program director.

ACCT 750. Accounting Theory. 3 Credits.
This course will examine the conceptual underpinnings of accounting, the development of those concepts, and accounting issues as related to contemporary financial reporting.

ACCT 755. Financial Statement Analysis. 3 Credits.
This course is the study of conceptual and practical aspects of the financial information in corporate annual reports. The course focuses on the interpretation and critical evaluation of financial information, rather than the mechanics of preparing financial reports.

ACCT 793. Individual Study/Tutorial. 1-5 Credits.

ACCT 795. Field Experience. 1-15 Credits.

ACCT 796. Special Topics. 1-5 Credits.

Aerospace Studies (AS)

AS 110. Air Force ROTC Fitness I/II. 0 Credits.
Introduction to various AFROTC team sports. Promotes benefits of being physically fit and maintaining Air Force fitness standards. May be repeated.

AS 111. Heritage and Values I Fall. 1 Credit.
AS 111 is a survey course designed to introduce students to the United States Air and Space Forces and provides an overview of the basic characteristics, missions, and organization of the Air and Space Forces.

AS 112. Heritage and Values II. 1 Credit.
Continuation of AS 111. "Heritage and Values II," is a survey course designed to introduce students to the Department of the Air Force (DAF) and provides an overview of the basic characteristics, missions, communications and organization of the Air Force and Space Force.

AS 210. Leadership Laboratory. 1 Credit.
Leadership Laboratory (LLAB) is a dynamic and integrated grouping of leadership developmental activities designed to meet the needs and expectations of prospective Department of the Air Force second lieutenants and complement the AFROTC academic program. It is a student planned, organized, and executed practicum conducted under the supervision of the Detachment Commander and Operations Flight Commander. For AS 100/200 level cadets. May be repeated for credit.

AS 211. Team and Leadership Fundamentals I. 1 Credit.
"Team and Leadership Fundamentals I," provides a fundamental understanding of both leadership and team building. The lessons and course flow are designed to prepare students for field training and leadership positions in the detachment.

AS 212. Team and Leadership Fundamentals II. 1 Credit.
Continuation of AS 211. "Team and Leadership Fundamentals II," provides a fundamental understanding of both leadership and team building. The lessons and course flow are designed to prepare students for field training and leadership positions in the detachment.

AS 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AS 294. Individual Study. 1-5 Credits.

AS 299. Special Topics. 1-5 Credits.

AS 321. Leading People and Effective Communication I. 3 Credits.
"Leading People and Effective Communication I," utilizes student's field training experience to take a more in-depth look at leadership. Special emphasis is placed on enhancing communication skills, and why that is important as a leader. Students have an opportunity to try out these leadership and management techniques in a supervised environment as juniors and seniors.

AS 322. Leading People and Effective Communication II. 3 Credits.
Continuation of AS 321. "Leading People and Effective Communication II," utilizes student's field training experience to take a more in-depth look at leadership. Special emphasis is placed on enhancing communication skills, and why that is important as a leader. Students have an opportunity to try out these leadership and management techniques in a supervised environment as juniors and seniors.

AS 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

AS 391. Seminar. 1-3 Credits.

AS 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AS 394. Individual Study. 1-5 Credits.

AS 399. Special Topics. 1-5 Credits.

AS 410. Leadership Laboratory. 1 Credit.
Leadership Laboratory (LLAB) is a dynamic and integrated grouping of leadership developmental activities designed to meet the needs and expectations of prospective Department of the Air Force second lieutenants and complement the AFROTC academic program. It is a student planned, organized, and executed practicum conducted under the supervision of the Detachment Commander and Operations Flight Commander. May be repeated for credit. Prereq: AS 210.

AS 441. National Security/Prep for Active Duty I. 3 Credits.
Designed for college seniors and provides them the foundation to understand their role as military officers and how they are directly tied to our National Security. It is an overview of the complex social and political issues facing the military profession and requires a measure of sophistication commensurate with the senior college level.

AS 442. National Security/Prep for Active Duty II. 3 Credits.
Designed for college seniors and provides them the foundation to understand their role as military officers and how they are directly tied to our National Security. It is an overview of the complex social and political issues facing the military profession and requires a measure of sophistication commensurate with the senior college level.

AS 491. Seminar. 1-5 Credits.

AS 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AS 494. Individual Study. 1-5 Credits.

AS 496. Field Experience. 1-15 Credits.

AS 499. Special Topics. 1-5 Credits.

Agribusiness & Applied Economics (AGEC)

AGEC 194. Individual Study. 1-3 Credits.

AGEC 196. Field Experience. 1-15 Credits.

AGEC 199. Special Topics. 1-5 Credits.

AGEC 242. Introduction to Agricultural Management. 3 Credits.
Economic and managerial concepts related to farm or agribusiness production process, development of cost data, enterprise analysis, organization and management of production inputs. 3 lectures.

AGEC 244. Agricultural Marketing. 3 Credits.
Study of the agricultural marketing system to include cash marketing, commodity futures trading, branded products merchandising and the interrelationship of the government and international trade. 3 lectures.

AGEC 246. Introduction to Agricultural Finance. 3 Credits.
Introduction to agricultural finance; provides background in farm and agribusiness credit use and evaluation. Discussion of specific financial conditions on farms and in agribusiness. A financial calculator will be required for this course. 3 lectures.

AGEC 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AGEC 294. Individual Study. 1-5 Credits.

AGEC 299. Special Topics. 1-5 Credits.

AGEC 339. Quantitative Methods & Decision Making. 3 Credits.
Application of basic probability concepts to decision analysis, introduction to linear programming models, forecasting, and project management. 3 lectures. Prereq: ECON 201 and MATH 144 or higher and CSCI 116 or MIS 116.

AGEC 342. Farm and Agribusiness Management II. 3 Credits.
Application of production economics principles to farm and agribusiness operations. Economic input-output principles and profit maximization. 3 lectures. Prereq: AGEC 242.

AGEC 343. Introduction to Commodity Trading. 3 Credits.
To learn mechanics of commodity information and technology in the commodity trading room (CTR). Emphasis will be on information, extracting information and analysis, as well as trading and risk management. Co-req: TL 116.

AGEC 344. Agricultural Price Analysis. 3 Credits.
Introduction to price analysis in agricultural markets. 3 lectures. Prereq: AGEC 244.

AGEC 346. Applied Risk Analysis. 3 Credits.
Development of tools to analyze business and financial risk problems unique to farms and agribusinesses. Prereq: AGEC 339, ECON 341, and STAT 331.

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. Cross-listed with BUSN 347.

AGEC 350. Agrisales. 3 Credits.
The principles of salesmanship applied to the agricultural business. Topics include attitudes and value systems, basic behavioral patterns, relationship of sales to marketing, selling strategies, preparing for sales calls, making sales presentations, and closing sales. 3 lectures.

AGEC 356. Advanced Agricultural Lending. 3 Credits.
Application of credit analysis principles including loan structure, financial analysis, borrower-lender relationship, legal aspect of lending, collateral valuation, and role of financial intermediaries in agriculture. Prereq: ECON 201 and AGEC 246 or FIN 320.

AGEC 360. International Agribusiness Experience. 3 Credits.
Provides students an applied context for analyzing international agribusiness. Students participate in a self- or pre-arranged experience and research an agribusiness topic in depth prior to and while studying in a foreign country.

AGEC 371. Export Management. 3 Credits.
Survey of practices that facilitate increasing a business' export activities, with emphasis on how a business plans to expand its import opportunities.

AGEC 375. Applied Agricultural Law. 3 Credits.
Study of laws affecting agriculture and agribusiness including property ownership, financial relations, and environmental regulation.

AGEC 378. Introduction to Transportation & Logistics. 3 Credits.
Presents the role and importance of transportation, with detailed discussion of the various modes and their specific characteristics. Covers basic logistics concepts in addition to transportation, including inventory, warehousing, and location decisions. Prereq: ECON 201.

AGEC 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

AGEC 393. Undergraduate Research. 1-5 Credits.

AGEC 394. Individual Study. 1-5 Credits.

AGEC 396. Field Experience. 1-15 Credits.

AGEC 397. Fe/Coop Ed/Internship. 1-4 Credits.

AGEC 399. Special Topics. 1-5 Credits.

AGEC 420. Integrated Farm and Ranch Management. 3 Credits.
Intended for persons who will advise or manage farm and ranch operations. Application of all phases of management (including marketing, finance) to crop and livestock production practice. 2 lectures, 1 laboratory. Prereq: AGEC 242, AGEC 244, or AGEC 246.

AGEC 444. Advanced Commodity Trading. 3 Credits.
Capstone course for commodity marketing option. Advanced work on topics related to marketing of crops. 2 lectures. Prereq: STAT 331 or ECON 410. Coreq: AGEC 339.{Also offered for graduate credit - see AGEC 644.}.

AGEC 445. Agribusiness Industrial Strategy. 3 Credits.
The course integrates industrial organization topics with specific applications to agribusiness strategy problems. Focus is on industry analysis and issues in competition, strategy, and rivalry from an agribusiness perspective. Prereq: AGEC 344. Coreq: AGEC 339.

AGEC 446. Agribusiness Finance. 3 Credits.
Application of financial theory to investment and liability management problems of agribusiness and farm firms. Characteristics, operations, and management of agricultural financial institutions. 3 lectures. Prereq: AGEC 339. Co-req: AGEC 346. {Also offered for graduate credit - see AGEC 646.}.

AGEC 450. National AgriMarketing Association (NAMA) I. 1 Credit.
Learn the components of an agribusiness marketing plan and apply this knowledge in the development of a marketing plan for a selected product. 1 lecture. May be repeated for credit.

AGEC 451. National AgriMarketing Association (NAMA) II. 1 Credit.
Review the components of an agribusiness marketing plan. Work in teams to prepare written and oral marketing plans for the National NAMA student chapter competition. 1 lecture. May be repeated for credit. Recommended prereq: AGEC 450.

AGEC 452. Food Laws & Regulations. 3 Credits.
Regulations, laws, and dynamics governing development of food policy.

AGEC 472. Advanced Logistical Analysis. 3 Credits.
Presents major analytical tools and methods used in analyzing logistical strategies. Course emphasis is on application of analytical tools used in quantifying logistical problems by manufacturing, trading, and shipping firms. Prereq: AGEC 378 and AGEC 339 or MGMT 360.

AGEC 474. Cooperatives. 3 Credits.
Theory, practice, and evaluation of cooperatives including principles, management, marketing, finance, taxes, legal issues, and adjusting to change. Prereq: ECON 201. Cross-listed with BUSN 474. {Also offered for graduate credit - see AGEC 674.}.

AGEC 484. Agricultural Policy. 3 Credits.
Analysis of the evolution and development of federal food, natural resource, and trade policies and their consequences on the agricultural sector. Exploration of how microeconomic forces influence formulation of macroeconomic agricultural policy. Prereq: ECON 201, Junior standing.

AGEC 491. Seminar. 1-5 Credits.

AGEC 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AGEC 494. Individual Study. 1-5 Credits.

AGEC 496. Field Experience. 1-15 Credits.

AGEC 499. Special Topics. 1-5 Credits.

AGEC 644. Advanced Commodity Trading. 3 Credits.
Capstone course for commodity marketing option. Advanced work on topics related to marketing of crops. 2 lectures. {Also offered for undergraduate credit - see AGEC 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 AGEC 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 AGEC 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 AGEC 474.}.

AGEC 690. Graduate Seminar. 1-3 Credits.

AGEC 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AGEC 695. Field Experience. 1-15 Credits.

AGEC 696. Special Topics. 1-5 Credits.

AGEC 701. Research Methods. 3 Credits.
Developing the skills necessary to formulate and conduct economics research. Topics include: conducting literature review and identifying gaps in the literature, formulating research questions and hypotheses, testing hypotheses, addressing causal identification issues, gathering and managing economic data, analyzing economic data, and effectively communicating research findings in both written and oral formats. 3 lectures. Cross-listed with ECON 701.

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: AGEC 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, AGEC 741. Cross-listed with SAFE 720.

AGEC 725. Food Policy. 3 Credits.
Provides quantitative tools and models used to analyze general food safety policies. Three lectures. Prereq: SAFE 670. Cross-listed with SAFE 725 and CFS 725.

AGEC 739. Analytical Methods for Applied Economics. 3 Credits.
Study and application of operations research techniques and other decision methods to problems in agriculture, transportation, and resource management. 3 lectures.

AGEC 741. Advanced Microeconomics. 3 Credits.
Advanced analysis of demand, production, and costs; pricing output and resource allocation under various market structures.

AGEC 743. Advanced Macroeconomics. 3 Credits.
Advanced analysis of macroeconomic theories; economic growth, business fluctuations, and inflation.

AGEC 744. Agribusiness I: Agricultural Product Marketing and Agribusiness Strategy. 3 Credits.
Conceptual foundations of agribusiness strategy, food product marketing, and strategic planning are presented. Emphasis is placed on quantitative strategic decision making for the agribusiness firm.

AGEC 771. Economics of Transportation Systems. 3 Credits.
The course will provide an understanding of transportation economics and policy issues facing society. Topics include transportation demand, model costs, transportation competition and market power, transportation regulation, transportation investment, and the economics of transportation safety. Cross-listed with CE 771.

AGEC 790. Graduate Seminar. 1-3 Credits.

AGEC 791. Temporary/Trial Topics. 1-5 Credits.

AGEC 793. Individual Study/Tutorial. 1-5 Credits.

AGEC 794. Practicum/Internship. 1-15 Credits.

AGEC 795. Field Experience. 1-15 Credits.

AGEC 796. Special Topics. 1-5 Credits.

AGEC 797. Master's Paper. 1-3 Credits.

AGEC 797S. Comprehensive Project. 1-6 Credits.

AGEC 798. Master's Thesis. 1-10 Credits.

AGEC 892. Graduate Teaching Experience. 1-6 Credits.

AGEC 893. Individual Study/Tutorial. 1-5 Credits.

AGEC 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

AGEC 899. Doctoral Dissertation. 1-15 Credits.

Agricultural & Biosystems Engineering (ABEN)

ABEN 110. Introduction to Agricultural and Biosystems Engineering. 3 Credits.
Introduction to agricultural and biosystems engineering (ABEN) for students interested in pursuing the major and profession. Content emphasizes ABEN sub-disciplines through engineering problem solving and introductory design. 2 lectures. 1 laboratory. Prereq: MATH 103 or MATH 107.

ABEN 194. Individual Study. 1-3 Credits.

ABEN 196. Field Experience. 1-15 Credits.

ABEN 199. Special Topics. 1-5 Credits.

ABEN 255. Computer Aided Analysis & Design. 3 Credits.
Application and use of software for engineering design, analysis, and graphical communication. 2 lectures. F.

ABEN 263. Biological Materials Processing. 3 Credits.
Quantitative analysis of processing systems for food, biofuels and bioproducts using principles of mass and energy balances, fluid flow, steam properties and heat and mass transfer. 2 lectures, 1 three-hour laboratory. Prereq: MATH 146 or higher. Cross-listing: CFS 263.

ABEN 286. Introduction to Controlled Environment Agriculture. 3 Credits.
General principles and applications of controlled environment agriculture (CEA), including hydroponic, aeroponic, aquaponic, vertical farming, irrigation, high tunnel, low tunnel, mulches, and their management factors, such as lighting, heating, ventilation, media, nutrient, pest and smart technology. Prereq: Math 103.

ABEN 291. Seminar. 1-3 Credits.

ABEN 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ABEN 294. Individual Study. 1-3 Credits.

ABEN 299. Special Topics. 1-5 Credits.

ABEN 348. Agricultural Technology Exposition. 1 Credit.
Create a display of current or emerging agricultural technology and present it to stakeholders of the department and general public at the Ag Technology Expo. May be repeated for credit.

ABEN 358. Electric Energy Application in Agriculture. 3 Credits.
Basic principles of electricity, electrical wiring, electrical power distribution/services, electrical load calculations, lighting, motor and standby electric generator selection, solar and wind power principles, solid-state and electromagnetic sensors, electrical safety, Variable Frequency Drives (VFD), and Programmable Logic Controller (PLC). 2 lectures, 1 three-hour laboratory. Prereq: PHYS 252.

ABEN 377. Numerical Modeling in Agricultural and Biosystems Engineering. 3 Credits.
Numerical modeling using finite element and other techniques. Engineering applications include modeling of stress/strain, heat, and mass transfer in physical, natural resource, and biological systems such as grain and food products. 3 lectures. Prereq: MATH 266, ME 223. S.

ABEN 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ABEN 391. Seminar. 1-3 Credits.

ABEN 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ABEN 394. Individual Study. 1-5 Credits.

ABEN 397. Fe/Coop Ed/Internship. 1-4 Credits.

ABEN 399. Special Topics. 1-5 Credits.

ABEN 444. Transport Processes. 3 Credits.
Topics covered include modes and equations of energy and mass transport processes, transport properties of biomaterials and porous media, formulations of and solutions to energy and mass transfer problems, and engineering design considerations. Prereq: MATH 266 and CE 309 or ME 352 and ABEN 263. {Also offered for graduate credit - see ABEN 644.}.

ABEN 452. Bioenvironmental Systems Design. 3 Credits.
Study of psychrometrics, heat and mass transfer, and physiological requirements for livestock and bioproducts. Design of environmental modifications, livestock wastes and control systems. 3 lectures. Prereq: CE 309 or ME 350. F {Also offered for graduate credit - see ABEN 652.}.

ABEN 456. Biobased Energy. 3 Credits.
Topics to be addressed include: benefits and limitations of biobased energy development; resource potential; biomass production, harvest, storage, and transportation issues; and conversion technologies (e.g. combustion, pyrolysis, gasification, starch and cellulosic ethanol production; biodiesel production; and anaerobic digestion). Prereq: Junior standing in science or engineering. {Also offered for graduate credit - see ABEN 656.}.

ABEN 458. Process Engineering for Food, Biofuels and Bioproducts. 3 Credits.
Analysis and design of processing systems to preserve, purify and/or transform biological materials and products, especially through refrigeration, freezing, sterilization, aseptic processing, dehydration, extraction, distillation and chemical reaction. 3 lectures. Prereq: ABEN 263. F {Also offered for graduate credit - see ABEN 658.}.

ABEN 464. Resource Conservation and Irrigation Engineering. 4 Credits.
Engineering principles and design of systems for soil and water resource management and environmental protection. 3 lectures, 1 three-hour laboratory. Prereq: CE 309. {Also offered for graduate credit - see ABEN 664 .}.

ABEN 473. Agricultural Power. 3 Credits.
Theory, analysis, and testing of internal combustion engines, traction, power trains, hydraulic systems, vehicle dynamics, stability, and ergonomics in tractor design. Electrical power units including motors. Alternative energy systems. 2 lectures, 1 three-hour laboratory. Prereq: ME 350. F {Also offered for graduate credit - see ABEN 673 .}.

ABEN 478. Machinery Analysis & Design. 3 Credits.
Principles of design, development, and testing of agricultural machines and machine systems. Applications of computer aided design and FMEA. Prereq: ME 223. S {Also offered for graduate credit - see ABEN 678 .}.

ABEN 479. Fluid Power Systems Design. 3 Credits.
Fluid dynamics principles and fluid properties are applied to the study of function, performance, and design of system components and system for power transmission and control purposes. Prereq: ABEN 263 or CE 309 or 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 graduate credit - see ABEN 682.}.

ABEN 484. Drainage and Wetland Engineering. 3 Credits.
Drainage and wetland engineering principles, design, and water quality for agricultural and natural resources applications. Topics include soil, water, and plant relationships, water movement in soils, water quality (nitrogen and salinity), surface drainage, subsurface drainage and its modeling, and wetlands. Prereq CE 309 or SOIL 433. {Also offered for graduate credit - see ABEN 684.}.

ABEN 486. Design Project I. 2 Credits.
Capstone learning experience involving principles of design, project management, and evaluation. Student teams define a capstone project in their area of interest. 2 lecture/laboratory. Prereq: ABEN 263 and Senior standing.

ABEN 487. Design Project II. 2 Credits.
Continuation and completion of the capstone learning experience begun in ABEN 486. Communication in oral, written, and graphic forms is emphasized. 2 lectures/laboratories. Prereq: ABEN 486. S.

ABEN 491. Seminar. 1-5 Credits.

ABEN 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ABEN 494. Individual Study. 1-5 Credits.

ABEN 496. Field Experience. 1-15 Credits.

ABEN 499. Special Topics. 1-5 Credits.

ABEN 644. Transport Processes. 3 Credits.
Topics covered include modes and equations of energy and mass transport processes, transport properties of biomaterials and porous media, formulations of and solutions to energy and mass transfer problems, and engineering design considerations. {Also offered for undergraduate credit - see ABEN 444.}.

ABEN 652. Bioenvironmental Systems Design. 3 Credits.
Study of psychrometrics, heat and mass transfer, and physiological requirements for livestock and bioproducts. Design of environmental modifications, livestock wastes and control systems. 3 lectures. F {Also offered for undergraduate credit - see ABEN 452.}.

ABEN 656. Biobased Energy. 3 Credits.
Topics to be addressed include: benefits and limitations of biobased energy development; resource potential; biomass production, harvest, storage, and transportation issues; and conversion technologies (e.g. combustion, pyrolysis, gasification, starch and cellulosic ethanol production; biodiesel production; and anaerobic digestion). Prereq: Junior standing in science or engineering. {Also offered for undergraduate credit - see ABEN 456.}.

ABEN 658. Process Engineering for Food, Biofuels and Bioproducts. 3 Credits.
Analysis and design of processing systems to preserve, purify and/or transform biological materials and products, especially through refrigeration, freezing, sterilization, aseptic processing, dehydration, extraction, distillation and chemical reaction. F {Also offered for undergraduate credit - see ABEN 458.}.

ABEN 664. Resource Conservation and Irrigation Engineering. 4 Credits.
Engineering principles and design of systems for soil and water resource management and environmental protection. 3 lectures, 1 three-hour laboratory. {Also offered for undergraduate credit - see ABEN 464.}.

ABEN 673. Agricultural Power. 3 Credits.
Theory, analysis, and testing of internal combustion engines, traction, power trains, hydraulic systems, vehicle dynamics, stability, and ergonomics in tractor design. Electrical power units including motors. Alternative energy systems. 2 lectures, 1 three-hour laboratory. F {Also offered for undergraduate credit - see ABEN 473 .}.

ABEN 678. Machinery Analysis & Design. 3 Credits.
Principles of design, development, and testing of agricultural machines and machine systems. Applications of computer aided design and FMEA. S {Also offered for undergraduate credit - see ABEN 478 .}.

ABEN 679. Fluid Power Systems Design. 3 Credits.
Fluid dynamics principles and fluid properties are applied to the study of function, performance, and design of system components and system for power transmission and control purposes. Cross-listed with ME 679. {Also offered for undergraduate credit - see ABEN 479 .}.

ABEN 682. Instrumentation & Measurements. 3 Credits.
Application of instrumentation and sensor concepts to measurement and control of environmental, biological, and mechanical parameters. Includes sensor principles, signal conditioning, data collection, and data analysis methods. 2 lectures, 1 three-hour laboratory. S {Also offered for undergraduate credit - see ABEN 482.}.

ABEN 684. Drainage and Wetland Engineering. 3 Credits.
Drainage and wetland engineering principles, design, and water quality for agricultural and natural resources applications. Topics include soil, water, and plant relationships, water movement in soils, water quality (nitrogen and salinity), surface drainage, subsurface drainage and its modeling, and wetlands. {Also offered for undergraduate credit - see ABEN 484.}.

ABEN 690. Graduate Seminar. 1-3 Credits.

ABEN 696. Special Topics. 1-5 Credits.

ABEN 747. Numerical Modeling of Environmental and Biological Systems. 3 Credits.
Numerical methods of systems analysis will be taught through real-world case studies. Topics covered include simplification and mathematical description of real systems; the finite-difference methods for solving differential equations; and parameter estimation sensitivity analysis, and uncertainty analysis methods. S (even years).

ABEN 750. Bioprocess Engineering. 3 Credits.
Application of biological, biochemical, and engineering fundamentals for industrial bioprocessing. Topics include bioprocessing kinetics (enzymes, cell growth, substrate utilization, and product formation); bioenergetics; bioreactor selection and scale-up; and product recovery.

ABEN 758. Applied Computer Imaging and Sensing for Biosystems. 3 Credits.
Sensors and non-destructive sensing principles (e.g., computer vision, spectroscopy, imaging, fiber optic sensing) for bioproduction and processing applications. Data/signal acquisition, signal conditioning/analysis techniques, signal interpretation, and pattern recognition using statistical, neural networks, and fuzzy logic techniques.

ABEN 765. Small Watershed Hydrology and Modeling. 3 Credits.
Study and representation of hydrologic processes on small watersheds. Application of hydrologic models for surface flow, subsurface flow, nutrient and sediment transport, and water quality. Prereq: ABEN 664. F (odd years).

ABEN 790. Graduate Seminar. 1-3 Credits.

ABEN 791. Temporary/Trial Topics. 1-5 Credits.

ABEN 793. Individual Study/Tutorial. 1-5 Credits.

ABEN 795. Field Experience. 1-15 Credits.

ABEN 796. Special Topics. 1-5 Credits.

ABEN 797. Master's Paper. 1-3 Credits.

ABEN 798. Master's Thesis. 1-10 Credits.

ABEN 899. Doctoral Dissertation. 1-15 Credits.

Agricultural Systems Management (ASM)

ASM 115. Fundamentals of Agricultural Systems Management. 3 Credits.
Overview of agricultural systems management; engines, machinery, structures, electricity, processing, and conservation. 3 lectures. Co-req: MATH 103 or MATH 104 or MATH 107 or placement.

ASM 125. Fabrication & Construction Technology. 3 Credits.
Introduction to materials, methods, and tools used in fabrication, installation, and maintenance of agricultural production and processing facilities. 2 lectures, 1 three-hour laboratory.

ASM 194. Individual Study. 1-3 Credits.

ASM 196. Field Experience. 1-15 Credits.

ASM 199. Special Topics. 1-5 Credits.

ASM 225. Computer Applications in Agricultural Systems Management. 3 Credits.
Application and use of software for problem solving, reporting, and graphical communication. 2 lectures. Prereq: CSCI 114 or TL 116; and MATH 103 or higher.

ASM 234. 3D Printing and Manufacturing. 2 Credits.
3D or Additive Manufacturing is quickly taking over the more traditional ways of making things through subtractive manufacturing methods. 3D printing is making more and more of the proto types, parts, and products we use everyday in a quicker, more responsible way. This course will explore how 3D printing started, generative design, how to 3D print, and how is it currently being used in industry. Students in this class will utilize 3D printers, scanners, and laser cutters to gain hands on experience in the world of 3D manufacturing and tour local 3D companies to see real life manufacturing in progress.

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. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ASM 294. Individual Study. 1-5 Credits.

ASM 299. Special Topics. 1-5 Credits.

ASM 323. Post-Harvest Technology. 3 Credits.
Principles and management of crop and feed storage, handling, drying, processing, and crop/feed systems siting, planning, and development. 3 lectures. Prereq: MATH 103 or MATH 104.

ASM 348. Agricultural Technology Exposition. 1 Credit.
This course provides understanding of showing and explaining the latest innovations in agricultural technology. Students practice good communication skills and learn task management for completion of a project. Higher level thinking skills are used and demonstrated through preparing displays for public viewing and interaction. May be repeated for credit.

ASM 354. Electricity and Electronic Applications. 3 Credits.
Fundamentals and applications of electricity, power distribution, controls, motors, and solid-state electronics. For non-engineering majors. 2 lectures, 1 three-hour laboratory. Prereq: Junior standing, MATH 103 or MATH 104.

ASM 368. Structures and Environment Systems. 3 Credits.
Study of environmental needs of animals and bioproducts, control of building environments, construction materials, framing systems, and functional planning for biosystem structures. 3 lectures. Prereq: MATH 103 or MATH 104.

ASM 373. Tractors & Power Units. 3 Credits.
Theory and principles of operation, use, maintenance, repair, and selection of tractors and power systems. Includes engines, transmissions, fuel, lubrication, hydraulics, traction, and electrical systems. 3 lectures. Prereq: MATH 103 or MATH 104.

ASM 374. Power Units Laboratory. 1 Credit.
Laboratory to complement concepts introduced in ASM 373. Topics include engine systems, operation, adjustment, maintenance, repair, measurement, and testing. 1 three-hour laboratory. Prereq: MATH 103 or 104.

ASM 378. Machinery Principles and Management. 3 Credits.
Principles of agricultural machinery manufacture, sales, operation, and management. Topics include selection, replacement, operation, application, and maintenance. 2 lectures, 1 three-hour laboratory. Prereq: MATH 103 or MATH 104.

ASM 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ASM 391. Seminar. 1-3 Credits.

ASM 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ASM 394. Individual Study. 1-5 Credits.

ASM 396. Field Experience. 1-15 Credits.

ASM 397. Fe/Coop/Internship. 1-4 Credits.

ASM 399. Special Topics. 1-5 Credits.

ASM 429. Hydraulic Power Principles and Applications. 3 Credits.
Study of fluid power principles, components, schematics, and systems. Emphasis is on proper use, maintenance, and applications of hydraulic power equipment. Prereq: Junior standing. Co-req: PHYS 120.

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.

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.

ASM 475. Management of Agricultural Systems. 2 Credits.
Capstone learning experience involving team solution to problems in agricultural systems management. Oral and written communications are emphasized. 2 lectures. Prereq: Senior standing. {Also offered for graduate credit - see ASM 675.}.

ASM 491. Seminar. 1-5 Credits.

ASM 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ASM 494. Individual Study. 1-5 Credits.

ASM 496. Field Experience. 1-15 Credits.

ASM 499. Special Topics. 1-5 Credits.

ASM 675. Management of Agricultural Systems. 2 Credits.
Capstone learning experience involving team solution to problems in agricultural systems management. Oral and written communications are emphasized. 2 lectures. {Also offered for undergraduate credit - see ASM 475}.

Agriculture General (AGRI)

AGRI 115. Wonders of Weather. 3 Credits.
This class reveals the mystery of the wonders of every-day weather. Through hands-on experimentation, observations, and discussion of day-to-day weather, students curious about weather and its impacts will come to understand the natural forces structuring the Earth's atmosphere and its weather patterns that directly impact lives of all sharing the Mother Earth.

AGRI 120. Feeding and Fueling the World. 3 Credits.
A comprehensive introduction to the field of agriculture, offering a foundational understanding of the principles, practices, and challenges inherent in modern agricultural systems. Exploration of the multifaceted aspects of agriculture, ranging from traditional farming techniques to cutting-edge technologies that drive sustainable and efficient food, fuel, and fiber production.

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.

AGRI 199. Special Topics. 1-5 Credits.

AGRI 291. Seminar. 1-3 Credits.

AGRI 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AGRI 294. Individual Study. 1-5 Credits.

AGRI 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

AGRI 391. Seminar. 1-3 Credits.

AGRI 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AGRI 394. Individual Study. 1-5 Credits.

AGRI 397. Coop/Internship. 1-4 Credits.

AGRI 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AGRI 496. Field Experience. 1-15 Credits.

AGRI 790. Graduate Seminar. 1-5 Credits.

AGRI 793. Individual Study/Tutorial. 1-5 Credits.

Allied Science (ASCI)

ASCI 125. Medical Terminology for Health Professionals. 1 Credit.
A systematic study of building medical terms and understanding their relationship to human anatomy and physiology, pathology and medical treatment. Pre-CLS, pre-RC, pre-RS, pre-Nursing, pre-Pharmacy majors will receive first preference. Remaining spots, up to the class limit, will then be open to all major programs.

ASCI 184. Understanding and Developing Compassion in Patient Care. 1 Credit.
Examination of multiple perspectives on compassion, and reflection on the role of compassion and empathy broadly and in relation to healthcare. Opportunity to apply these concepts through volunteer service in a patient care setting. Prereq or Coreq: Restricted to Pre-Radiologic Sciences, Pre-Respiratory Care or Pre-Medical Laboratory Science majors only.

ASCI 190. Critical Thinking, Academic, and Professional Skills for the Health Professions. 3 Credits.
This course provides students with opportunities to develop proficient critical thinking and clinical problem-solving skills as they are used in the health professions. This course will also immerse students in reasoning-related activities that facilitate academic success, teamwork, and a demonstrated commitment to the roles and responsibilities required of all health professionals. Cross-listed with PHRM 190 and PH 190.

Animal Sciences (ANSC)

ANSC 101. Student Success Techniques - Animal and Equine Science. 1 Credit.
This course is designed to ease the transition for new students. Students will learn skills and techniques used by successful college students. Topics will include: an overview of the animal and equine science programs, internship & study abroad opportunities, career opportunities, professional communication, as well as student success basics. Prereq: Animal Science and Equine Science majors only.

ANSC 102. Student Success Techniques - Animal Sciences with Pre-Veterinary Medicine Emphasis. 1 Credit.
This course is designed to ease the transition for new students. Students will learn skills and techniques used by successful college students. Topics will include: an overview of the veterinary school requirements, options within the animal sciences program, professional communication, internship & study abroad opportunities, career opportunities, as well as student success basics. Prereq: Animal Science or Equine Science majors only.

ANSC 114. Introduction to Animal Sciences. 3 Credits.
General principles of the livestock industry and relationships to mankind. 2 lectures, 1 two-hour laboratory.

ANSC 165. Animals and Human Health. 3 Credits.
Students will explore the intersection among human, animal, and environmental health within the One Health framework, emphasizing models of disability, the human-animal bond, and the impact of animal-assisted interventions at the personal and societal levels.

ANSC 194. Individual Study. 1-5 Credits.

ANSC 196. Field Experience. 1-15 Credits.

ANSC 199. Special Topics. 1-5 Credits.

ANSC 200. Introduction to Anthrozoology. 3 Credits.
In this course students will be introduced to anthrozoology: the study of the interactions and relationships between humans and non-human animals. In this class we will explore the roles that non-human animals play in human society, considering the benefits that we humans receive and the responsibilities we have toward other species. Research findings involving human-animal interactions will be explored.

ANSC 201. Student Success Techniques - Nontraditional & Transfer Students. 1 Credit.
This course is designed to ease the transition for student new to NDSU. The specific focus of this course will be dependent on the interests and needs of enrolled students. Some of the topics will include: an overview of the animal and equine science programs, internship & study abroad opportunities, career opportunities, professional communication, and student success basics. Prereq: Animal Science or Equine Science majors only.

ANSC 210. Introduction to Therapeutic Horsemanship. 3 Credits.
This course will introduce students to perspectives of disabilities, how equine assisted activities may affect individuals with specific disabilities, how to select appropriate horses and adaptive equipment, and will include discussion on the history and current discipline of therapeutic horsemanship and related fields. F.

ANSC 218. Anatomy and Physiology of Domestic Animals. 3 Credits.
This course is an introduction to the anatomy and physiology of common domestic animals with an emphasis on how the normal structure and functions of the body contribute to health. A systems approach will be used to explore the interactions and complexity of the body.

ANSC 219. Anatomy and Physiology Laboratory. 1 Credit.
This laboratory course complements and reinforces lecture material presented in Anatomy and Physiology of Domestic Animals. It is an introduction to anatomy and physiology of common domestic animals with emphasis on how the normal structures and functions of the body contribute to health.

ANSC 220. Livestock Production. 3 Credits.
General production and management of major meat and dairy animal species. Topics include production systems, feeding, facilities, health, economics, and marketing. 2 lectures, 1 two-hour laboratory.

ANSC 223. Introduction to Animal Nutrition. 2 Credits.
Principles of feeding livestock and pets including digestive systems, nutrient characteristics, nutrient requirements, and feed sources used in formulating balanced rations.

ANSC 230. Meat Grading and Evaluation. 2 Credits.
Evaluation and grading of carcasses and wholesale cuts of beef, pork, and lamb. Written explanation of decisions and comparisons. 2 three-hour laboratories. F.

ANSC 231. Livestock Evaluation. 2 Credits.
The study of evaluating breeding and market livestock based on records, appearance, and soundness. 2 three-hour laboratories. Prereq: ANSC 240. F.

ANSC 232. Dairy Cattle Evaluation. 2 Credits.
Visual appraisal and evaluation of dairy cattle. Type classification of dairy cattle. 2 three-hour laboratories. F.

ANSC 235. Equine Evaluation. 2 Credits.
Detailed study of horse conformation, selection criteria, and judging standards for equine competitions. Emphasis will be placed on development of critical thinking, decision making, and oral presentation skills. 2 three-hour laboratories. May be repeated. Prereq: ANSC 260. F.

ANSC 240. Meat Animal Evaluation and Marketing. 3 Credits.
Relationship between live animal composition and meat product values. Introduction to basic muscle biology and effects of livestock practices on meat quality. 2 lectures, 1 two-hour laboratory.

ANSC 241. Survey of Meat Science. 2 Credits.
Introduction to aspects of fresh and processed meat technology. Co-reqs: ANSC 243, ANSC 244, ANSC 245.

ANSC 243. Slaughter and Processing of Domestic Livestock. 4 Credits.
This course will teach the principles and procedures of meat animal humane slaughter, carcass fabrication, and meat processing. You will be required to help in all processes of slaughter, fabricating, processing, and cleaning. Prereq: Students must be in the North Dakota College of Science Meat Processing certificate program. Co-req: ANSC 241, ANSC 244, ANSC 245.

ANSC 244. Value-added Meats Processing. 2 Credits.
An investigation of factors involved in the production of processed and value-added meat products by hands-on training and classroom instruction. Prereq: Students must be enrolled in the North Dakota State College of Science meat processing certificate program. Co-req: ANSC 241, ANSC 243, ANSC 245.

ANSC 245. Hazard Analysis and Critical Control Points. 2 Credits.
Students will become familiar with hazard analysis, critical control point and food safety plans, including good manufacturing practices and standard operating procedures for safe food production. Prereq: Student must be enrolled in North Dakota State College of Science meat processing program. Co-req: ANSC 241, ANSC 243, ANSC 244.

ANSC 260. Introduction to Equine Studies. 2 Credits.
Introduction to basic aspects of equine studies and general principles surrounding the horse industry. 2 one-hour lectures. F.

ANSC 260L. Equine Care and Management Practicum. 1 Credit.
A laboratory course designed to supplement lecture material covered in ANSC 260. Students will learn management and husbandry skills relevant to modern horse care practices. 1 two-hour laboratory. F,S.

ANSC 261. Basic Equitation & Horsemanship. 1 Credit.
Basic grooming, saddling, bridling, mounting, ground work, correct riding position, and proper coordination of the riding aids will be addressed. Horse behavior will also be discussed throughout the course. 1 two-hour laboratory. Lab fee required. Enrollment priority will be given to Equine Studies Major/Minor/Certificate students.

ANSC 265L. Principles of Equine Assisted Services Lab. 2 Credits.
This course is focused on the application of theoretical knowledge of equine assisted services through experiential learning techniques. Prereq: ANSC 165 and ANSC 261.

ANSC 291. Seminar. 1-5 Credits.

ANSC 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ANSC 294. Individual Study. 1-5 Credits.

ANSC 296. Field Experience. 1-15 Credits.

ANSC 299. Special Topics. 1-5 Credits.

ANSC 300. Domestic Animal Behavior and Management. 3 Credits.
Discussion of animal behavior, with an emphasis on physiology, as it relates to management, handling and housing of domestic animals. Basic methods of measuring behavior are explored. Prereq: ANSC 114, VETS 135.

ANSC 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 323. Fundamentals of Nutrition. 3 Credits.
Fundamentals of nutrition emphasizing digestion, metabolism, function, requirements, and sources of specific nutrients. 3 lectures. Recommended Prereq: ANSC 123, BIOC 260. S.

ANSC 324. Applied Animal Nutrition. 3 Credits.
The application of nutrition principles in feed management systems for livestock, poultry, and pets. Prereq: ANSC 323.

ANSC 330. Competitive Meat Grading and Evaluation. 2 Credits.
Senior meat judging team. Team members will travel to intercollegiate meat judging contests. May be repeated. Prereq: ANSC 230.

ANSC 331. Competitive Livestock Evaluation. 2 Credits.
Evaluation of breeding and market livestock with an emphasis on preparing students for judging competition. 3 three-hour laboratories plus additional times to be arranged. May be repeated. Prereq: ANSC 231.

ANSC 332. Competitive Dairy Cattle Evaluation. 2 Credits.
Visual appraisal and evaluation of dairy cattle for competition at national dairy evaluation contests. 2 three-hour laboratories plus time to be arranged. Prereq: ANSC 232 and a minimum cumulative 2.0 GPA. May be repeated for credit.

ANSC 340. Principles of Meat Science. 3 Credits.
Introduction to the anatomical, physiological, developmental, and biochemical aspects conversion of muscle to meat and aspects of fresh and processed meat technology, preservation, microbiology, and current issues. 2 lectures, 1 two-hour laboratory.

ANSC 344. Fundamentals of Meat Processing. 2 Credits.
Chemical and physical relationships in meat preservation, sausage production, and other meat product preparation. 1 lecture, 1 three-hour laboratory.

ANSC 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 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 365. Equine Assisted Services Practicum I. 1 Credit.
In this practicum course, students will complete phase I of their teaching requirements for the Certified Therapeutic Riding Instructor Certification Exam. Prereq: ANSC 265L and ANSC 361.

ANSC 370. Fundamentals/Animal Disease. 3 Credits.
Basic principles of disease processes and prevention. Comparative review emphasizing infectious and management related diseases in production and companion species. An emphasis will be placed on public health. Prereq: ANSC 218 or BIOL 220. Recommended prereq: ANSC 114 and MICR 202 or MICR 350.

ANSC 371. Fundamentals of Animal Disease II. 3 Credits.
Basic principles of disease processes and prevention. Comparative review emphasizing infectious and management related diseases in domestic animals with a focus on canine, feline and equine species. An emphasis will be placed on public health. Prereq: ANSC 218.

ANSC 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ANSC 380. Livestock Sales and Marketing. 2 Credits.
Students will learn the importance of livestock marketing, catalog development, livestock photography, sale advertising, and animal management, and will hold a sale at the end of the semester. Prereq: Junior or Senior standing.

ANSC 380L. Livestock Sales and Marketing Laboratory. 1 Credit.
Students will learn the importance of livestock marketing by utilizing livestock selection and evaluation, catalog development, livestock photography, sale advertising, and animal management. Furthermore students will build a customer database, prepare sale advertisements and announcements using various forms of communication such as written and electronic. Students will manage numerous social media platforms. At the end of the semester, students will manage and conduct a livestock auction. Prereq: Junior or Senior standing. Co-req: ANSC 380.

ANSC 391. Seminar. 1-5 Credits.

ANSC 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ANSC 393. Undergraduate Research. 1-5 Credits.

ANSC 394. Individual Study. 1-5 Credits.

ANSC 396. Field Experience. 1-15 Credits.

ANSC 397. Fe/Coop Ed/Internship. 1-15 Credits.

ANSC 399. Special Topics. 1-5 Credits.

ANSC 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: BIOC 260. {Also offered for graduate credit - see ANSC 644.}.

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. {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. Prereq: ANSC 463.{Also offered for graduate credit - see ANSC 663L.}.

ANSC 465. Equine Assisted Services Practicum II. 1 Credit.
In this practicum course, students will complete phase 2 of their teaching requirements for the Certified Therapeutic Riding Instructor Certification Exam. Prereq: ANSC 365.

ANSC 475. One Health. 2 Credits.
This course focuses on One Health concepts, emphasizing the interconnectivity between human, animal and environmental health. Prereq: Senior standing. Cross-listed with PH 475 Dual-listing: ANSC 675 and PH 675.

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 323 or ANSC 360, ANSC 357 or ANSC 358 and ANSC 463.

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. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ANSC 494. Individual Study. 1-5 Credits.

ANSC 496. Field Experience. 1-15 Credits.

ANSC 499. Special Topics. 1-5 Credits.

ANSC 640. Hazard Analysis Critical Control Point (HACCP) and Food Safety Systems. 2 Credits.
Students will become familiar with hazard analysis, critical control point and food safety plans, including good manufacturing practices and standard operating procedures for safe food production. {Also offered for undergraduate credit - see ANSC 440.}.

ANSC 644. Livestock Muscle Physiology. 3 Credits.
Basic concepts in muscle growth and development of livestock, evaluating the effects of environment, welfare, nutrition and genetics regarding muscle metabolism and physiology, and how this ultimately affects the nature of muscle as food. {Also offered for undergraduate credit - see ANSC 444.}.

ANSC 658. Evaluation and Use of Breeds of Livestock. 3 Credits.
Evaluation of breeds of cattle, sheep and swine with emphasis of breed comparison research and breed history. Examination of appropriate use of existing breed resources and development of new breeds. {Also offered for undergraduate credit - see ANSC 458.}.

ANSC 663. Physiology of Reproduction. 3 Credits.
Comparative anatomy, physiology, and endocrinology of reproduction in mammals. {Also offered for undergraduate credit - see ANSC 463.}.

ANSC 663L. Physiology of Reproduction Laboratory. 1 Credit.
Anatomy, physiology and demonstration and utilization of techniques in large animal reproductive management. {Also offered for undergraduate credit - see ANSC 443L.}.

ANSC 675. One Health. 2 Credits.
This course focuses on One Health concepts, emphasizing the interconnectivity between human, animal and environmental health. Cross-listed with PH 675. Dual-listing: ANSC 475 and PH 475.

ANSC 687. Growing and Finishing Cattle Management. 3 Credits.
Integrated management of cattle fed for slaughter with emphasis on nutrition, health, marketing, and risk management; covers the beef enterprise from weaning to market. {Also offered for undergraduate credit - see ANSC 487.}.

ANSC 690. Graduate Seminar. 1-5 Credits.

ANSC 695. Field Experience. 1-15 Credits.

ANSC 696. Special Topics. 1-5 Credits.

ANSC 701. Writing and Communicating in the Animal Sciences. 3 Credits.
Studying and practicing scientific writing and communication in the animal science discipline.

ANSC 725. Advanced Equine Nutrition. 3 Credits.
This course explores concepts in equine nutrition including digestive physiology of horses, nutrient requirements for different classes of horses and feed management. Ration evaluation and balancing, as well as problem solving will be a core component to this course. Prereq: ANSC 776.

ANSC 740. Data Analyses and Designs of Experiments. 3 Credits.
Experimental design principles, introductory statistical theory, and commonly used data analyses of animal science data are taught and practiced with practical applications using the computer. 3 lectures. Prereq: STAT 725.

ANSC 755. Advanced Meat Science. 3 Credits.
An in-depth investigation of the physical and biochemical characteristics of muscle and meat. Students will gain an understanding of advanced meat science topics, and improve their ability to design, conduct, interpret and report meat science research. (even years).

ANSC 756. History and Perspectives in Animal Breeding. 1 Credit.
Historical perspective to the discipline of animal breeding and genetics. Introduction to the contributions of geneticists who have significantly impacted the discipline. Material includes pre-recorded interviews of scientists that have had an international impact in animal breeding and genetics. Critique key papers.

ANSC 758. Molecular Biological Techniques in Animal Sciences. 3 Credits.
The theory and application of molecular biology laboratory techniques to the field of animal sciences.

ANSC 759. Application of Quantitative Genetics in R Software. 1 Credit.
Introduction and application of R software for basic and intermediate tasks in quantitative genetic analyses. Prereq: ANSC 752 Selection Index Theory and Application, which is offered through the Great Plains IDEA Quantitative Genetics and Genomics program, or equivalent.

ANSC 773. Energy Metabolism. 3 Credits.
Methods of measuring energy values and the metabolic processes involved in the production of useful biological energy from organic compounds. 3 lectures. Prereq: BIOC 701. F (odd years).

ANSC 774. Nitrogen Metabolism. 3 Credits.
Detailed overview of nitrogenous compounds including metabolism and function. Considerable emphasis on current research from the literature. 3 lectures. Prereq: BIOC 701. S (even years).

ANSC 776. Digestive Physiology. 3 Credits.
Investigation of digestive and absorptive events occurring within farm animals. Emphasis on enzyme action, nutrient transport, gut motility, gastro-intestinal endocrinology, and current research. 3 lectures. Prereq: BIOC 701. F (odd years).

ANSC 790. Graduate Seminar. 1-5 Credits.

ANSC 791. Temporary/Trial Topics. 1-5 Credits.

ANSC 792. Graduate Teaching Experience. 1-6 Credits.

ANSC 793. Individual Study/Tutorial. 1-5 Credits.

ANSC 795. Field Experience. 1-15 Credits.

ANSC 796. Special Topics. 1-5 Credits.

ANSC 797. Master's Paper. 1-3 Credits.

ANSC 798. Master's Thesis. 1-10 Credits.

ANSC 813. Domestic Animal Endocrinology. 3 Credits.
Detailed overview of the function of hormones and their effects on physiological systems. Considerable emphasis will be placed on experimental approaches, approaches to manipulate endocrine status, and current literature.

ANSC 828. Advanced Reproductive Biology. 3 Credits.
Discussion of reproductive physiology research with emphasis on current topics in cellular and molecular biology. 3 lectures. S (odd years).

ANSC 830. Growth Biology. 3 Credits.
Regulation of growth at the cell/tissue, organ systems, and whole animal levels. 3 lectures. S (even years).

ANSC 850. Linear Models in Animal Breeding. 1 Credit.
Principles of linear models used in animal breeding. Models discussed in the context of the random variable that is to be predicted. Material includes animal models, sire/maternal grandsire models, and sire models, models with a single and repeated records, and models with both direct and maternal effects. Prereq: ANSC 751, ANSC 752.

ANSC 851. Genetic Prediction. 1 Credit.
Principles for using best linear unbiased prediction (BLUP) in genetic prediction. Material includes data integrity diagnosis, contemporary grouping strategies, adjusting for known non-genetic effects, the AWK Programming Language, UNIX/Linux scripting, and use of modern computational tools to perform genetic evaluations. Emphasis on real-world datasets designed to develop applied analytical skills in animal breeding. Prereq: ANSC 752, ANSC 850.

ANSC 852. Applied Variance Component Estimation. 1 Credit.
Principles in the estimation of (co)variance components and genetic parameters required to solve mixed models typical in livestock genetics. Focus on applied knowledge of approaches used to estimate the G and R sub-matrices of the mixed model equations. Demonstrate models commonly used in parameter estimation. Introduce scientific literature concerning implementation, and attributes of the solutions, of variance component estimation strategies. Prereq; ANSC 850, ANSC 851.

ANSC 875. Vitamins and Minerals. 3 Credits.
Metabolism of vitamins and minerals and their application in animal nutrition and the feed industry. 3 lectures. Prereq: BIOC 701. F (even years).

ANSC 892. Graduate Teaching Experience. 1-6 Credits.

ANSC 899. Doctoral Dissertation. 1-15 Credits.

Anthropology (ANTH)

ANTH 111. Introduction to Anthropology. 3 Credits.
Introductory overview to anthropology, the holistic study of humans and the diversity of the human experience over space and time. Covers the major fields of anthropology: cultural and biological anthropology, archaeology, linguistics, applied anthropology.

ANTH 194. Individual Study. 1-3 Credits.

ANTH 196. Field Experience. 1-15 Credits.

ANTH 199. Special Topics. 1-5 Credits.

ANTH 204. Archaeology and Prehistory. 3 Credits.
Introduction to archaeological methods, followed by a survey of world prehistory.

ANTH 205. Human Origins. 3 Credits.
Examination of the evolution of humans through the investigation of fundamental principles of evolution, human variation, comparative primate behavior, and the fossil record.

ANTH 206. Introduction to Cultural Anthropology: Peoples of the World. 3 Credits.
Core concepts, theories, and practices in cultural anthropology and anthropological knowledge application in a globalizing world. Through rich, engaging ethnographic texts and case studies, focuses on selected societies and culture change in deep sociohistorical contexts.

ANTH 209. Introduction to Linguistics. 3 Credits.
Entry-level knowledge for the scientific study of language, including such topics as phonetics, phonology, morphology, semantics, grammar, social and cultural dimensions, acquisition, variation and similarities among languages of the world, and related cultural history. Cross-listed with ENGL 209.

ANTH 291. Seminar. 1-3 Credits.

ANTH 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ANTH 294. Individual Study. 1-5 Credits.

ANTH 298. Professional Seminar. 1 Credit.
The Professional Seminar is designed to support students in gaining the professional skills they need to support their career goals. In this professional seminar, students will build their career skills and learn more about careers in sociology. In addition, they will have the opportunity to develop their career goals and develop a plan to support those goals. Prereq: Students must be at least sophomore standing. Cross-listed with SOC 298.

ANTH 299. Special Topics. 1-5 Credits.

ANTH 332. Medical Anthropology. 3 Credits.
Examines cultural conceptions, beliefs, and practices regarding health, illness, disease, and treatment through a cross-cultural and historical perspective. The course includes theoretical, methodological, and case study perspectives from physical anthropology, archaeology, and cultural anthropology.

ANTH 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ANTH 391. Seminar. 1-3 Credits.

ANTH 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ANTH 394. Individual Study. 1-5 Credits.

ANTH 399. Special Topics. 1-5 Credits.

ANTH 438. Historical Archaeology. 3 Credits.
Examines the development, methods, and research themes of historical archaeology. Cross-listed with HIST 438. Dual-listing: ANTH 638 and HIST 638.

ANTH 441. Death and Dying. 3 Credits.
Examination of research, theories, and case studies on the sociocultural dimensions of death and dying across time and societies. Topics include suicide, funerals, hospice practice, disasters, afterlife beliefs, grief, bereavement and memory, organ donation, death in popular culture, end-of-life issues, cemeteries and body disposition, euthanasia, art, film, music and literature, genocide, and war. Cross-listed with SOC 441. {Also offered for graduate credit - see ANTH 641 .}.

ANTH 442. Feminist Anthropology. 3 Credits.
Explores the methodologies, theoretical frameworks, and activism that shapes feminist anthropological research. Feminist anthropology has helped to expand the scope of the field and has encouraged scholars to be more inclusive, critical, and engaged. {Also available for graduate credit - See ANTH 642.}.

ANTH 445. Archaeology of Native North America. 3 Credits.
This course introduces students to the archaeology of Indigenous North America from initial human colonization to the onset of the global era. The course provides students with a firm foundation in major themes in the development and diversity of Indigenous cultures in North America, as well as an introduction to key sites and archaeological remains that document these societies. Regions covered include the Great Plains, Eastern Woodlands, Southwest, and Pacific Coast. Topical coverage includes earliest inhabitants, hunter-fisher-gatherer lifeways, the origins of agriculture, mound-building and ritual landscapes, long-distance trade, death and burial, the development of village-based societies, social complexity, and early European colonialism. {Also offered for graduate credit - see ANTH 645.}.

ANTH 446. Anthropology of Latin America. 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 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 456. Madness and Culture. 3 Credits.
This course draws from medical and psychological anthropology, cultural psychiatry, and science studies to examine understandings of madness across social and cultural settings through ethnography, literature, and multimedia resources. Dual-listing: ANTH 656.

ANTH 458. Indigenous Peoples and Cultures of the Upper Midwest. 3 Credits.
This interdisciplinary seminar introduces students to the rich history and culture of the Indigenous peoples of the Upper Midwest. {Also offered for graduate credit - see ANTH 658.}.

ANTH 462. Anthropology and the Environment. 3 Credits.
The environment as understood through anthropological research. Focus on ethnographic texts confronting global environmental issues through specific context (place, cultural, historical) and human-environment interactions as shaped by political, economic, and social relations. Prereq: ANTH 111. {Also offered for graduate credit - see ANTH 662.}.

ANTH 470. Theory in Archaeology. 3 Credits.
Theory doesn't always get the best rap. It has a reputation for being dry and distanced from the 'real world'. But theory isn't something we can do without. Any statement about what happened in the past depends on theory. Even apparently trivial activities like drawing a stratigraphic profile or cataloguing artifacts rely on theoretical concepts, though these are often taken for granted. This is because theory is how we make sense of the world. It provides a framework for understanding, a basis for asking new questions, and a guide for how data should be collected and arranged. Because theory isn't optional, it needs to be critically and carefully thought out. In this course, we'll do just that by examining in detail how theory (a) helps us to define what archaeology as a field consists of, (b) provides a vision of human culture, social relations, and long-term change, and, (c) determines appropriate methods for excavating and interpreting archaeological remains. May be repeated. {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. {Also offered for graduate credit - see ANTH 671.}.

ANTH 478. History and Cultures of the Caribbean. 3 Credits.
Explores the societies and cultures of the Caribbean through anthropological and historical sources. Topics covered include colonization, slavery, resistance, and rebellion; building of Caribbean nation-states; and globalization and transnationalism. Race, gender, sexualities, labor, nationalism, and creolization will be considered. {Also offered for graduate credit - see ANTH 678.}.

ANTH 479. Community-Based and Indigenous Archaeologies. 3 Credits.
Over the last three decades, archaeologists as scholars and practitioners have been challenged to become more accountable to, engaged with, and inclusive of, multiple publics, especially descendant and Indigenous communities. This has given rise to various forms of archaeological practice that cluster around ideas of ethical engagement, social justice, activism, decolonization, and Indigenous rights. In this senior seminar, students will explore the developing fields of Community-Based and Indigenous archaeologies from a wide variety of perspectives. {Also available for graduate credit - See ANTH 679.}.

ANTH 480. Development of Anthropological Theory. 3 Credits.
Focus on major theoretical orientations in anthropology. Emphasis on the ways in which anthropological theories are used to generate explanations for multicultural phenomena. {Also offered for graduate credit - see ANTH 680.}.

ANTH 481. Ethnographic Research Methods. 3 Credits.
Focuses on qualitative research methods, with an emphasis on ethnographic methods used in cultural anthropology and sociology. Instruction in the theoretical orientations and ethics underlying immersive participant-observation fieldwork, and application of its central practices, including key informant and in-depth interviews, document and photo collection, journaling and reflective memos, and qualitative data analysis. {Also offered for graduate credit - see ANTH 681.}.

ANTH 489. Senior Capstone In Anthropology. 1 Credit.
Synthesis of social research methods, anthropological theory, and sub-discipline content material. Emphasis on integrative skills needed to interrelate the basic concepts of the discipline. Prereq: Senior standing.

ANTH 491. Seminar. 1-5 Credits.

ANTH 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ANTH 493. Undergraduate Research. 1-5 Credits.

ANTH 494. Individual Study. 1-5 Credits.

ANTH 496. Field Experience. 1-15 Credits.

ANTH 499. Special Topics. 1-5 Credits.

ANTH 638. Historical Archeology. 3 Credits.
Examines the development, methods, and research themes of historical archaeology. Cross-listed with HIST 638. Dual-listing: ANTH 438 and HIST 438.

ANTH 641. Death and Dying. 3 Credits.
Examination of research, theories, and case studies on the sociocultural dimensions of death and dying across time and societies. Topics include suicide, funerals, hospice practice, disasters, afterlife beliefs, grief, bereavement and memory, organ donation, death in popular culture, end-of-life issues, cemeteries and body disposition, euthanasia, art, film, music and literature, genocide, and war. Cross-listed with SOC 641. {Also offered for undergraduate credit - see ANTH 441.}.

ANTH 642. Feminist Anthropology. 3 Credits.
Explores the methodologies, theoretical frameworks, and activism that shapes feminist anthropological research. Feminist anthropology has helped to expand the scope of the field and has encouraged scholars to be more inclusive, critical, and engaged. {Also available for undergraduate credit - See ANTH 442.}.

ANTH 645. Archaeology of Native North America. 3 Credits.
This course introduces students to the archaeology of Indigenous North America from initial human colonization to the onset of the global era. The course provides students with a firm foundation in major themes in the development and diversity of Indigenous cultures in North America, as well as an introduction to key sites and archaeological remains that document these societies. Regions covered include the Great Plains, Eastern Woodlands, Southwest, and Pacific Coast. Topical coverage includes earliest inhabitants, hunter-fisher-gatherer lifeways, the origins of agriculture, mound-building and ritual landscapes, long-distance trade, death and burial, the development of village-based societies, social complexity, and early European colonialism. {Also offered for undergraduate credit - see ANTH 445.}.

ANTH 646. Anthropology of Latin America. 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 656. Madness and Culture. 3 Credits.
This course draws from medical and psychological anthropology, cultural psychiatry, and science studies to examine understandings of madness across social and cultural settings through ethnography, literature, and multimedia resources. Dual-listing: ANTH 456.

ANTH 658. Indigenous Peoples and Cultures of the Upper Midwest. 3 Credits.
This interdisciplinary seminar introduces students to the rich history and culture of the Indigenous peoples of the Upper Midwest. {Also offered for undergraduate credit - see ANTH 458.}.

ANTH 662. Anthropology and the Environment. 3 Credits.
The environment as understood through anthropological research. Focus on ethnographic texts confronting global environmental issues through specific context (place, cultural, historical) and human-environment interactions as shaped by political, economic, and social relations. {Also offered for undergraduate credit - see ANTH 462.}.

ANTH 664. Disaster and Culture. 3 Credits.
Examines human-made and natural disasters through cross-cultural and historical perspectives. Addresses cultural variation across and within relevant communities including those of disaster victims, emergency management systems, and a broad public. Prereq: Junior or Senior standing. {Also offered for undergraduate credit - see ANTH 464.}.

ANTH 670. Theory in Archaeology. 3 Credits.
Theory doesn't always get the best rap. It has a reputation for being dry and distanced from the 'real world'. But theory isn't something we can do without. Any statement about what happened in the past depends on theory. Even apparently trivial activities like drawing a stratigraphic profile or cataloguing artifacts rely on theoretical concepts, though these are often taken for granted. This is because theory is how we make sense of the world. It provides a framework for understanding, a basis for asking new questions, and a guide for how data should be collected and arranged. Because theory isn't optional, it needs to be critically and carefully thought out. In this course, we'll do just that by examining in detail how theory (a) helps us to define what archaeology as a field consists of, (b) provides a vision of human culture, social relations, and long-term change, and, (c) determines appropriate methods for excavating and interpreting archaeological remains. May be repeated. {Also offered for undergraduate credit - see ANTH 470.}.

ANTH 671. Archaeological Research Methods. 3 Credits.
Overview of the most often used or potentially useful archaeological methods and their applications in fieldwork, laboratory processing, and specialized analytical techniques. Focus on problem-solving skills through the application of different archaeological methods. {Also offered for undergraduate credit - see ANTH 471.}.

ANTH 678. History and Cultures of the Caribbean. 3 Credits.
Explores the societies and cultures of the Caribbean through anthropological and historical sources. Topics covered include colonization, slavery, resistance, and rebellion; building of Caribbean nation-states; and globalization and transnationalism. Race, gender, sexualities, labor, nationalism, and creolization will be considered. {Also offered for undergraduate credit - see ANTH 478.}.

ANTH 679. Community-Based and Indigenous Archaeologies. 3 Credits.
Over the last three decades, archaeologists as scholars and practitioners have been challenged to become more accountable to, engaged with, and inclusive of, multiple publics, especially descendant and Indigenous communities. This has given rise to various forms of archaeological practice that cluster around ideas of ethical engagement, social justice, activism, decolonization, and Indigenous rights. In this senior seminar, students will explore the developing fields of Community-Based and Indigenous archaeologies from a wide variety of perspectives. {Also available for undergraduate credit - See ANTH 479.}.

ANTH 680. Development of Anthropological Theory. 3 Credits.
Focus on major theoretical orientations in anthropology. Emphasis on the ways in which anthropological theories are used to generate explanations for multicultural phenomena. {Also offered for undergraduate credit - see ANTH 480.}.

ANTH 681. Ethnographic Research Methods. 3 Credits.
Focuses on qualitative research methods, with an emphasis on ethnographic methods used in cultural anthropology and sociology. Instruction in the theoretical orientations and ethics underlying immersive participant-observation fieldwork, and application of its central practices, including key informant and in-depth interviews, document and photo collection, journaling and reflective memos, and qualitative data analysis. {Also offered for undergraduate credit - see ANTH 481.}.

ANTH 690. Graduate Seminar. 1-3 Credits.

ANTH 695. Field Experience. 1-15 Credits.

ANTH 696. Special Topics. 1-5 Credits.

ANTH 790. Graduate Seminar. 1-5 Credits.

ANTH 793. Individual Study/Tutorial. 1-5 Credits.

ANTH 794. Practicum/Internship. 1-8 Credits.

ANTH 795. Field Experience. 1-15 Credits.

ANTH 797. Master's Paper. 1-3 Credits.

ANTH 798. Master's Thesis. 1-10 Credits.

ANTH 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

Apparel, Merchandising, Interior Design & Hospitality Management (ADHM)

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 291. Seminar. 1-3 Credits.

ADHM 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ADHM 294. Individual Study. 1-5 Credits.

ADHM 299. Special Topics. 1-5 Credits.

ADHM 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 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ADHM 381. Hospitality Marketing and Sales. 3 Credits.
Basic marketing theory and contemporary practice as adapted to the hospitality industry. Emphasis on consumer behavior, market opportunities, marketing research and strategies, and marketing plans. Prereq: ADHM 140, ADHM 141.

ADHM 384. Beverage Operations. 3 Credits.
Identification and evaluation of beverages served in hospitality establishments with a focus on making quality decisions. Beverages presented will include alcohol (spirits, wines, liqueurs, and beer), coffee, tea, soft drinks, and mineral waters. Prereq: ADHM 140 or 141 and students must be 21 years of age or older as of February 1st.

ADHM 391. Seminar. 1-3 Credits.

ADHM 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ADHM 394. Individual Study. 1-5 Credits.

ADHM 396. Field Experience. 1-15 Credits.

ADHM 397. Fe/Coop Ed/Internship. 1-4 Credits.

ADHM 399. Special Topics. 1-5 Credits.

ADHM 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: ADHM 140 or ADHM 141.

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 407. Restaurant Entrepreneurship. 3 Credits.
This course introduces students to the theory and practice of restaurant entrepreneurship. Entrepreneurial theory and practice relevant to the business environment will be discussed from the perspectives of a startup restaurant business. Prereq: ADHM 140.

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 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 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 491. Seminar. 1-5 Credits.

ADHM 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ADHM 494. Individual Study. 1-5 Credits.

ADHM 496. Field Experience. 1-15 Credits.

ADHM 499. Special Topics. 1-5 Credits.

ADHM 635. Cost Controls in Hospitality and Food Service Systems. 3 Credits.
Provides fundamental knowledge of hospitality managerial accounting, cost controls, and financial management. Includes financial statement analysis, cost concepts, cost-volume-profit analysis, calculating and controlling food and beverage costs, pricing, and capital budgeting. {Also offered for undergraduate credit - see ADHM 435.}.

ADHM 690. Graduate Seminar. 1-3 Credits.

ADHM 695. Field Experience. 1-15 Credits.

ADHM 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 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.

Apparel, Retail Merchandising, and Design (ARMD)

Architecture (ARCH)

ARCH 194. Individual Study. 1-3 Credits.

ARCH 196. Field Experience. 1-15 Credits.

ARCH 199. Special Topics. 1-5 Credits.

ARCH 231. Creativity and Communication. 3 Credits.
Introductory course that covers the key aspects of the creative problem-solving process as applied in the design of buildings, the landscape, and communities, with an introduction to design visualization and visual thinking, information management, design methods, design process management, studio culture, and professional communication. Prereq: Admission into the second year of the Architecture program.

ARCH 232. Design Technology. 3 Credits.
Introductory exploration of digital design media and environmental technology in architecture and landscape architecture. Prereq or Co-req: ARCH 271 or LA 271.

ARCH 233. Math for Designers. 1 Credit.
Elementary investigations and applied learning activities focused on mathematical influences on architecture through history, proportioning, geometric modeling, trigonometric identities, fractals, algorithms, and parametric modeling. Prereq: Admission into the second year of the Architecture or Landscape Architecture program.

ARCH 271. Architectural Design I. 6 Credits.
Studio course focused on beginning exercises in basic design, incorporating abstract two-dimensional design, functional response to environmental determinants, the articulation of form, spatial organization, and aesthetic judgment. Prereq: . Admission into second year of program.

ARCH 272. Architectural Design II. 6 Credits.
Studio course focused on exercises in basic design incorporating abstract two-dimensional design, functional response to environmental determinants, the articulation of form, spatial organization, and aesthetic judgment. Prereq: ARCH 271.

ARCH 291. Seminar. 1-3 Credits.

ARCH 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ARCH 294. Individual Study. 1-5 Credits.

ARCH 296. Field Experience. 1-15 Credits.

ARCH 299. Special Topics. 1-5 Credits.

ARCH 321. History and Theory of Architecture I. 3 Credits.
History and theory of architecture from ancient times through the Renaissance with attention placed on the design connections across cultures and across the globe. Lecture course.

ARCH 322. History and Theory of Architecture II. 3 Credits.
History of architecture from the Baroque to the mid-range of modernism, placed within a global perspective. Lecture course.

ARCH 323. History and Theory of Architecture III. 3 Credits.
History and theory of architecture from the mid-range of modernism to the contemporary, exploring different movements, methods, and ideas, including global and vernacular influences. Prereq: Admission into the second year of the Architecture or Landscape Architecture program.

ARCH 341. Site Design for Architects. 3 Credits.
Intermediate investigations and applied learning activities directed towards understanding building site inventory, analysis, and appropriate design responses. Prereq: ARCH 272.

ARCH 344. Architectural Structures I. 3 Credits.
Overview of the principles of statics and mechanics of materials and structural concepts relative to building members and frames. Prereq: ARCH 271 and admission to the Architecture program.

ARCH 351. Materials & Construction. 3 Credits.
Study of building materials from source through manufacture, focusing on their contribution to design and the study of the assembly processes of construction. Lecture course. Prereq: ARCH 272.

ARCH 371. Architectural Design III. 6 Credits.
Studio courses providing intermediate level exercises in architectural design; responding to contextual, cultural, environmental, climatic, technological, and aesthetic determinants. Prereq: ARCH 272.

ARCH 372. Architectural Design IV. 6 Credits.
Studio course continuing intermediate level exercises in architectural design: responding to contextual, cultural, environmental, climatic, technological, and aesthetic determinants. Prereq: ARCH 371.

ARCH 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ARCH 391. Seminar. 1-3 Credits.

ARCH 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ARCH 394. Individual Study. 1-5 Credits.

ARCH 397. Fe/Coop Ed/Internship. 1-4 Credits.

ARCH 399. Special Topics. 1-5 Credits.

ARCH 443. Architectural Structures II. 3 Credits.
Overview of the principles of statics and mechanics of materials and structural concepts relative to building members and frames. Prereq: ARCH 344, ARCH 372.

ARCH 450. Architectural Detailing. 3 Credits.
Study of wood, steel, masonry, and concrete construction assemblies through architectural detailing, with an introduction to specifications and construction documents. Prereq: ARCH 371.

ARCH 453. Environmental Control Systems: Passive Principles. 3 Credits.
Study of architectural design related to thermal comfort, climate, passive solar systems, daylighting, acoustics, and other environmental concerns. Prereq: ARCH 272.

ARCH 454. Environmental Control System: Active System. 3 Credits.
Study of the basic fundamentals of illumination and basic power generation, distribution and service; heating, ventilation, and air-conditioning systems; plumbing systems; and acoustics as they relate to building design. Prereq: ARCH 371, 453.

ARCH 461. Urban Design. 3 Credits.
Study of urban form and urban theory, development, and processes in a historic and contemporary context. Prereq: ARCH 371 or LA 371.

ARCH 471. Architectural Design V. 6 Credits.
Studio courses involving the complex organization of architectural spaces and forms in an urban context. Prereq: ARCH 372.

ARCH 472. Architectural Design VI. 6 Credits.
Studio courses involving the complex organization of architectural spaces and forms in an urban context. Prereq: ARCH 471.

ARCH 474. International Design Studio. 6 Credits.
Comprehensive design studio experience in advanced architectural studies to be conducted in culturally diverse, international locations. Prereq: ARCH 471.

ARCH 491. Seminar. 1-5 Credits.

ARCH 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ARCH 493. Undergraduate Research. 1-5 Credits.

ARCH 494. Individual Study. 1-5 Credits.

ARCH 496. Field Experience. 1-15 Credits.

ARCH 497. FE/Coop Ed/Internship. 1-4 Credits.

ARCH 499. Special Topics. 1-5 Credits.

ARCH 721. Non-Western Architectural Traditions. 3 Credits.
Advanced course on the investigation of design methods and building traditions of non-Western cultures and diverse geographic regions. May be repeated.

ARCH 722. Urbanism. 3 Credits.
Advanced course to explore in-depth aspects of urban design. May be repeated.

ARCH 723. Historic Preservation. 3 Credits.
Advanced course to explore the philosophy and techniques of preserving historic buildings. May be repeated.

ARCH 724. Architectural Technology. 3 Credits.
Advanced course to explore the historical and theoretical underpinnings of architectural technology. May be repeated.

ARCH 725. Architecture or the Recent Past. 3 Credits.
Advanced course to explore the major architectural movements and personalities since the mid-20th century. May be repeated.

ARCH 726. Current Architectural Theory. 3 Credits.
Advanced course focused on current issues and the work and design theory of leading architectural practitioners around the world. May be repeated.

ARCH 727. Vernacular Architectural Traditions. 3 Credits.
Advanced course to explore vernacular architectural traditions in North America and elsewhere. May be repeated.

ARCH 728. Sociocultural Issues. 3 Credits.
Advanced course focused on the social issues and movements that have influenced environmental design. May be repeated.

ARCH 763. Thesis Research. 3 Credits.
An introduction to research methodologies and the research required to complete a design thesis in a first professional degree program in Architecture at the graduate level. Completion of a Thesis Proposal and a Thesis Research document in preparation for the Design Thesis Studio to follow. Prereq: ARCH 472.

ARCH 771. Advanced Architectural Design. 6 Credits.
Advanced studio course addressing complex design problems requiring increased self-direction.

ARCH 772. Design Thesis. 8 Credits.
Advanced studio course devoted to the execution of a comprehensive design thesis project, from schematic design through design development, presentation, and review. Prereq: ARCH 663, ARCH 771.

ARCH 781. Professional Practice. 3 Credits.
Study of contemporary architectural practice covering professional development, firm organization, and project management within the context of the ethical, legal, and regulatory environment. Cross-listed with LA 581.

ARCH 789. Professional Topics in Architecture. 3 Credits.
Various topics related to theorectical 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 794. Practicum/Internship. 1-8 Credits.

ARCH 795. Field Experience. 1-10 Credits.

ARCH 796. Special Topics. 1-5 Credits.

Art (ART)

ART 110. Introduction to the Visual Arts. 3 Credits.
Study and analysis of artistic methods and meaning in the visual arts; designed for non-majors.

ART 111. Introduction to Art History. 3 Credits.
Survey of world art from prehistoric to modern times designed for non-majors.

ART 120. Painting I. 3 Credits.
Introduction to basic painting through a variety of materials. Includes historical examples, painting the human figure, using acrylics, oils, pastel, and mixed-media.

ART 122. Studio Technology Foundations. 3 Credits.
Studio Technology Foundations is an introductory-level course in the Department of Visual Art. Lectures, demonstrations, and class assignments offer students an introduction to core technologies in the visual arts and equip students with a working knowledge of their respective operations and applications.

ART 124. Foundations of Design. 3 Credits.
Foundations of Design is an introductory course that provides a comprehensive study of design elements and principles for work in two and three-dimensions.

ART 130. Drawing I. 3 Credits.
Study and application of different drawing media, methods, and techniques. Drawing from the human figure required.

ART 131. Foundations Drawing. 3 Credits.
This course emphasizes observational and technical skill development in a variety of media to solve literal and conceptual problems relating to the history of drawing.

ART 150. Ceramics I. 3 Credits.
Introduction to basic ceramic techniques. Includes wheel-throwing and hand-building techniques, surface decoration, glazing, and firing.

ART 153. Design Thinking and Creative Strategy. 3 Credits.
This course offers an introduction to the theory of art and design production, design processes, and critical theory, as it relates to the creation and reception of visual arts. Through a combination of lectures, reading discussions, and in-class activities students will learn strategies to solve problems and effectively move ideas into visual/conceptual statements.

ART 160. Sculpture I. 3 Credits.
Introduction to basic sculpture materials and techniques. Includes exploration of sculptural form in maquettes and large-scale work; additive and subtractive approaches in wood, stone, and mixed media; casting practice in plaster and hydro-stone.

ART 170. Printmaking I. 3 Credits.
Introduction to basic printmaking techniques and materials. Includes mono-print, collagraph, intaglio, relief, and serigraphy in both traditional and nontoxic methods.

ART 180. Photography I. 3 Credits.
Introduction to basic photography. Includes visual issues of black and white and color photography. Experience with black and white processing and printing.

ART 185. Graphic Design I. 3 Credits.
Introduction to the foundations and principles of graphic design and graphic design software.

ART 194. Individual Study. 1-3 Credits.

ART 196. Field Experience. 1-15 Credits.

ART 199. Special Topics. 1-5 Credits.

ART 210. Art History I. 3 Credits.
Intensive survey of art from Paleolithic to the Renaissance.

ART 211. Art History II. 3 Credits.
Intensive survey of art from the Renaissance to the present.

ART 220. Painting II. 3 Credits.
Intermediate study, studio practice, and critique. Use of oils, acrylics, watercolor, and mixed media. Painting the human figure and development of individual concept and content. Prereq: ART 120.

ART 230. Drawing II. 3 Credits.
Advanced study and application of different drawing media, methods, techniques and drawing the human figure. Prereq: ART 130.

ART 250. Ceramics II. 3 Credits.
Intermediate study, studio practice, and critique. Development of individual concept and content. Further exploration of forming skills and surface decoration. Introduction to basic mold techniques, clay and glaze theory, and kiln technology. Prereq: ART 150.

ART 260. Sculpture II. 3 Credits.
Intermediate study, practice, and critique. Further exploration of materials and processes. Development of individual concept and content. Prereq: ART 160.

ART 270. Printmaking II. 3 Credits.
Intermediate study, studio practice, and critique. Extension of process and media. Development of individual concept and content. Prereq: ART 170.

ART 280. Digital Image and Output. 3 Credits.
Introduction to digital photography workflow, digital image editing software, and inkjet printing. Prereq: ART 180.

ART 291. Seminar. 1-3 Credits.

ART 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ART 294. Individual Study. 1-3 Credits.

ART 299. Special Topics. 1-5 Credits.

ART 320. Topics in Painting. 3 Credits.
Instruction in topics related to the advanced study of painting. Studio techniques, project development, and effective visual and oral communication practices are emphasized. May be repeated for credit. Prereq: ART 120.

ART 330. Drawing III. 3 Credits.
Advanced study, studio practice, and critique. Use of mixed-media approaches. Emphasis on individual concept and content. Life drawing emphasis. Prereq: ART 230.

ART 335. Figure Drawing. 3 Credits.
Exploration of the human form through drawing representationally, abstractly and expressively using a variety of media. Studying historic and contemporary use of the figure will be significant. Prereq: ART 130.

ART 350. Topics in Ceramics. 3 Credits.
Instruction in topics related to the advanced study of ceramics. Studio techniques, project development, and effective visual and oral communication practices are emphasized. May be repeated for credit. Prereq: ART 150.

ART 360. Sculpture III. 3 Credits.
Advanced study, practice, and critique. Use of mixed-media. Specialization in materials and processes. Emphasis on individual concept and content. Prereq: ART 260.

ART 370. Topics in Printmaking. 3 Credits.
Instruction in topics related to the advanced study of printmaking. Studio techniques, project development, and effective visual and oral communication practices are emphasized. May be repeated for credit. Prereq: ART 170.

ART 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ART 380. Topics in Photography. 3 Credits.
Instruction in topics related to the advanced study of photography. Studio techniques, project development, and effective visual and oral communication practices are emphasized. May be repeated for credit. Prereq: ART 180.

ART 385. Advanced Topics in Graphic Design. 3 Credits.
Development of concepts and practices related to graphic design, digital technologies and their applications in design and visual arts. May be repeated for credit. Prereq: ART 185.

ART 389. Art Theory and Criticism. 3 Credits.
This course covers the development and application of art theory and criticism from the advent of photography to the present. The course presents theory and criticism as fluid methods of understanding art. The course covers standard theories as well as their critical applications. Prereq: ART 210, ART 211.

ART 390. Advanced Studio Arts Development. 3-6 Credits.
Instruction in topics related to the advanced study and development of the studio arts. Studio techniques, project iteration, and effective visual and oral communication practices are emphasized. May be repeated for credit. Corequisite: ART 391 or ART 491. Prerequisite: Requires one from the following: ART 120, ART 150, ART 160, ART 170, ART 180 or ART 185.

ART 391. Seminar. 1-3 Credits.

ART 392. Global Practicum: Study Abroad. 1-3 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ART 394. Individual Study. 1-3 Credits.

ART 399. Special Topics. 1-5 Credits.

ART 420. Baccalaureate Studio: Painting. 3 Credits.
This course facilitates studio production for the Baccalaureate process. Work-flow will follow specific deadlines that accompany the critique schedule in ART 489. You will be working with your studio professor to prepare and develop a body of work that will culminate in an exhibition at the end of the semester. May be repeated for credit. Prereq: ART 320.

ART 430. Drawing IV. 3 Credits.
Advanced study, studio practice and critique in drawing. Exploration in individual concept, process and professional preparation. May be repeated. Prereq: ART 330.

ART 435. Advanced Figure Drawing. 3 Credits.
Advanced study, studio practice and critique in figure drawing. Continued exploration of the human form and development of an individual concept. May be repeated. Prereq: ART 335.

ART 450. Baccalaureate Studio: Ceramics. 3 Credits.
This course facilitates studio production for the Baccalaureate process. Work-flow will follow specific deadlines that accompany the critique schedule in ART 489. You will be working with your studio professor to prepare and develop a body of work that will culminate in an exhibition at the end of the semester. May be repeated for credit. Prereq: ART 350.

ART 451. History of American Art. 3 Credits.
Study of American art from pre-Columbian through contemporary (including Native American), emphasizing its highly individual nature and its effect on world art. Prereq: ART 210, ART 211.

ART 452. Contemporary Art. 3 Credits.
Study of the development of contemporary art examining its cultural and intellectual basis; includes analysis of current art imagery and readings in art theory and criticism.

ART 453. Topics in Art History. 3 Credits.
As an upper-division course in a specialized topic in Art History, the subject matter of the course varies by semester, allowing the curriculum to be more responsive and flexible in the subjects it addresses. May be repeated. Prereq: ART 210 or ART 211.

ART 460. Sculpture IV. 3 Credits.
Advanced study, studio practice and critique in sculpture. A focus on current issues in sculpture with innovative use of form, process and materials centered in a personal use of content and formal issues. May be repeated. Prereq: ART 360.

ART 470. Baccalaureate Studio: Printmaking. 3 Credits.
This course facilitates studio production for the Baccalaureate process. Work-flow will follow specific deadlines that accompany the critique schedule in ART 489. You will be working with your studio professor to prepare and develop a body of work that will culminate in an exhibition at the end of the semester. May be repeated for credit. Prereq: ART 370.

ART 480. Baccalaureate Studio: Photography. 3 Credits.
This course facilitates studio production for the Baccalaureate process. Work-flow will follow specific deadlines that accompany the critique schedule in ART 489. You will be working with your studio professor to prepare and develop a body of work that will culminate in an exhibition at the end of the semester. May be repeated for credit. Prereq: ART 380.

ART 485. Baccalaureate Studio: Graphic Design. 3 Credits.
This course facilitates studio production for the Baccalaureate process. Work-flow will follow specific deadlines that accompany the critique schedule in ART 489. You will be working with your studio professor to prepare and develop a body of work that will culminate in an exhibition at the end of the semester. May be repeated for credit. Prereq: ART 385.

ART 489. Baccalaureate Project. 3-6 Credits.
Capstone research and creative experience within a specific area of interest with emphasis on refinement of aesthetic applications of techniques and media. May be repeated.

ART 491. Seminar. 1-5 Credits.

ART 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ART 494. Individual Study. 1-5 Credits.

ART 496. Field Experience. 1-15 Credits.

ART 499. Special Topics. 1-5 Credits.

ART 690. Graduate Seminar. 1-5 Credits.

ART 793. Individual Study/Tutorial. 1-5 Credits.

Arts Humanities and Social Sciences (AHSS)

Courses

AHSS 188. Cultural Diversity Scholars. 2 Credits.
This course is required for all new first-year students and transfer students receiving the Cultural Diversity Tuition Discount. The course covers topics such as written and oral communication, critical thinking, and orientation to campus resources. Restricted to recipients of the cultural diversity tuition discount.

AHSS 191. Seminar. 1-5 Credits.

AHSS 199. Special Topics. 1-5 Credits.

AHSS 491. Seminar. 1-5 Credits.

AHSS 493. Undergraduate Research. 1-5 Credits.

AHSS 496. Field Experience. 1-15 Credits.

AHSS 690. Seminar. 1-5 Credits.

AHSS 695. Field Experience. 1-15 Credits.

AHSS 796. Special Topics. 1-5 Credits.

Athletics (ATHL)

ATHL 223. Intercollegiate Sports Participation. 1 Credit.
Participation on an intercollegiate sports team. May be repeated.

ATHL 323. Intercollegiate Sports Participation. 1 Credit.
Participation on an intercollegiate sports team. May be repeated.

Biochemistry (BIOC)

BIOC 194. Individual Study. 1-5 Credits.

BIOC 196. Field Experience. 1-15 Credits.

BIOC 199. Special Topics. 1-5 Credits.

BIOC 260. Elements of Biochemistry. 4 Credits.
Protein structure, function conformation, and dynamics; enzymes, DNA-RNA: structure and flow of genetic information; biological membranes; metabolism. 4 lectures. Prereq: CHEM 117 or CHEM 122 and CHEM 140 or CHEM 240.

BIOC 291. Seminar. 1-3 Credits.

BIOC 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BIOC 294. Individual Study. 1-5 Credits.

BIOC 299. Special Topics. 1-5 Credits.

BIOC 303. The Science of Learning. 1 Credit.
This course is designed for students serving as Learning Assistants in the College of Science and Mathematics and who are interested in the science behind learning in the STEM disciplines.

BIOC 350. Fundamentals of Forensic DNA Analysis. 2 Credits.
Principles, technologies, and analysis of genetic information (DNA) and its applications to forensic science, in particular, identity profiling.

BIOC 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

BIOC 391. Seminar. 1-3 Credits.

BIOC 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BIOC 394. Individual Study. 1-5 Credits.

BIOC 399. Special Topics. 1-5 Credits.

BIOC 460. Foundations of Biochemistry and Molecular Biology I. 3 Credits.
Rigorous treatment of biomolecules, generation and use of metabolic energy, biosynthesis, metabolic regulation; storage, transmission, and expression of genetic information. 3 lectures. Prereq: CHEM 240 or CHEM 341. Recommended Prereq: CHEM 342. {Also offered for graduate credit - see BIOC 660.}.

BIOC 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 473. Methods of Biochemical Research. 4 Credits.
Advanced separation, characterization, and enzymological techniques for research in the biological sciences are emphasized. 1 lecture, 2 three-hour laboratories. Prereq: BIOC 460. {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 prokaryoates, eukaryoates and archea, with primary emphasis on eukaryotic systems. Prereq: BIOC 460, BIOC 461.

BIOC 491. Seminar. 1-5 Credits.

BIOC 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BIOC 493. Undergraduate Research. 1-5 Credits.

BIOC 494. Individual Study. 1-5 Credits.

BIOC 496. Field Experience. 1-15 Credits.

BIOC 499. Special Topics. 1-5 Credits.

BIOC 660. Foundations of Biochemistry and Molecular Biology I. 3 Credits.
Rigorous treatment of biomolecules, generation and use of metabolic energy, biosynthesis, metabolic regulation; storage, transmission, and expression of genetic information. 3 lectures. {Also offered for undergraduate credit - see BIOC 460.}.

BIOC 661. Foundations of Biochemistry and Molecular Biology II. 3 Credits.
Interrelations between metabolic pathways and controls, with emphasis on mammalian systems; biochemistry of specialized tissues, fluids, and hormones; regulation of gene expression in eukaryotes; genetic defects in metabolism. 3 lectures. {Also offered for undergraduate credit - see BIOC 461.}.

BIOC 673. Methods of Biochemical Research. 4 Credits.
Advanced separation, characterization, and enzymological techniques for research in the biological sciences are emphasized. 1 lecture, 2 three-hour laboratories. Prereq: BIOC 701 and BIOC 660 or equivalent of BIOC 660. {Also offered for undergraduate credit - see BIOC 473.}.

BIOC 674. Methods of Recombinant DNA Technology. 3 Credits.
Principles and techniques of recombinant DNA construction, gene cloning, and analysis of gene structure. 1 lecture, 2 three-hour laboratories. Recommended co-req: BIOC 702. {Also offered for undergraduate credit - see BIOC 474.}.

BIOC 675. Computer Applications in Biochemistry and Molecular Biology. 3 Credits.
This course will cover basic and advanced biochemical calculations and the use of computer programs to make these calculations. Programs for the presentation of data and seminars will also be presented. Prereq: BIOC 660. {Also offered for undergraduate credit - see BIOC 475.}.

BIOC 683. Cellular Signal Transduction Processes and Metabolic Regulation. 3 Credits.
Advanced topics in regulation of metabolic processes including signal transduction, reversible and irreversible covalent modification, hormonal effects, protein turnover, and related phenomena. 2 lectures. Prereq: BIOC 702. F (alternate years) {Also offered for undergraduate credit - see BIOC 483.}.

BIOC 690. Graduate Seminar. 1-3 Credits.

BIOC 696. Special Topics. 1-5 Credits.

BIOC 701. Comprehensive Biochemistry I. 4 Credits.
Comprehensive treatment of the chemistry and biochemistry of proteins, nucleic acids, carbohydrates, lipids, vitamins, hormones, and the specific metabolism of these substances. 4 lectures.

BIOC 702. Comprehensive Biochemistry II. 4 Credits.
Comprehensive treatment of the chemistry and biochemistry of proteins, nucleic acids, carbohydrates, lipids, vitamins, hormones, and the specific metabolism of these substances. 4 lectures. Recommended: BIOC 701.

BIOC 716. Protein and Enzyme Biochemistry. 3 Credits.
Advanced topics in protein properties and structure, and the influence of these factors on enzyme kinetics and mechanism. 3 lectures. Prereq: BIOC 702. S (alternate years).

BIOC 719. Molecular Biology of Gene Expression and Regulation. 3 Credits.
Advanced topics in molecular biology and regulation in prokaryotes, eukaryotes, and archaea; early events in developmental gene expression. 3 lectures. Prereq: BIOC 702. F (alternate years).

BIOC 723. Structural Basis of Membrane Transport and Signaling. 3 Credits.
Advanced topics discussing how three-dimensional structures of membrane proteins dictate their function in coordinating the extracellular environment with intracellular processes. Prereq: BIOC 660 or BIOC 701.

BIOC 790. Graduate Seminar. 1-3 Credits.

BIOC 791. Temporary/Trial Topics. 1-5 Credits.

BIOC 793. Individual Study/Tutorial. 1-5 Credits.

BIOC 796. Special Topics. 1-5 Credits.

BIOC 798. Master's Thesis. 1-10 Credits.

BIOC 892. Graduate Teaching Experience. 1-6 Credits.

BIOC 899. Doctoral Dissertation. 1-15 Credits.

Biological Sciences (BIOL)

BIOL 100L. Non-Majors Biology Lab. 1 Credit.
Laboratory experience to introduce the application of the scientific method across a wide scale of biological topics, including molecular biology, the organism, evolution, and ecology. This lab may be taken as a co-requisite with BIOL 111, BIOL 124 or BIOL 126. Co-req: BIOL 111 or BIOL 124 or BIOL 126.

BIOL 104. Human Anatomy and Physiology Prep. 1 Credit.
This course is designed to improve the success of students when taking Human Anatomy and Physiology. The focus of the course will be to develop language literacy, visual literacy, study skills, and the understanding of science concepts that are fundamental to Human Anatomy and Physiology. Restrictions: First-year students.

BIOL 111. Concepts of Biology. 3 Credits.
Introduction to a wide range of biological topics, from the organism, ecology, and evolution to the cell, molecular biology, and genetics. For credit as a lecture/lab pair, students should take BIOL 100L as a co-requisite.

BIOL 124. Environmental Science. 3 Credits.
Ecological principles related to human cultures, resource use, and environmental alterations. For credit as a lecture/lab pair, students should take BIOL 100L as a co-requisite.

BIOL 126. Human Biology. 3 Credits.
Consideration of selected problems in human biology. For credit as a lecture/lab pair, students should take BIOL 100L as a co-requisite.

BIOL 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.

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.

BIOL 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will be introduced to skills and techniques used by successful college students. Topics will include campus resources, study techniques, time management, goal setting, degree planning, and career and major orientation.

BIOL 193. Undergraduate Research. 1-5 Credits.

BIOL 194. Individual Study. 1-5 Credits.

BIOL 196. Field Experience. 1-15 Credits.

BIOL 199. Special Topics. 1-5 Credits.

BIOL 220. Human Anatomy and Physiology I. 3 Credits.
An in-depth introduction to structure and function of human organ systems' cells, tissues, the integumentary system, the skeletal system, joints, muscle and muscular system, nervous tissue and nervous system, and the special senses. F.

BIOL 220L. Human Anatomy and Physiology I Laboratory. 1 Credit.
An in-depth introduction to structure and function of human organ systems' cells, tissues, the integumentary system, the skeletal system, joints, muscle and muscular system, nervous tissue and nervous system, and the special senses. F.

BIOL 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. Undergraduate Research Experience: Antibiotic Discovery. 3 Credits.
This course is an authentic research experience for undergraduates. Students in the course will participate in a larger national research initiative aimed at discovering new antibiotics produced by soil bacteria. Prereq: BIOL 150 and BIOL 151.

BIOL 271. Undergraduate Research Experience: Diet and Exercise Physiology. 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 151L.

BIOL 272. Undergraduate Research Experience: Health and Wellness Decisions. 3 Credits.
This course is an authentic research experience for undergraduates. Students in the course will explore the processes of learning and instruction in undergraduate biology through critical reading of literature, experimental design, data analysis, and communication of research findings. Prereq: BIOL 151L.

BIOL 273. Undergraduate Research Experience: Genomic Analysis. 3 Credits.
This course is an authentic research experience that provides students the opportunity to learn lab and analysis techniques used in genomics research, including sequencing of prokaryotic and eukaroytic DNA, and annotation of Drosophila sp. DNA. Prereq: BIOL 150 and BIOL 150L and BIOL 151 and BIOL 151L.

BIOL 274. Undergraduate Research Experience: Biomedical Research Analysis. 3 Credits.
This is an authentic research experience for undergraduates. Through critical reading of the literature, students in this course will explore elements of biomedical research including the ethics of working with human subjects, experimental design of clinical studies, and statistical analysis and interpretation of results. The course will culminate with students using public databases to conduct their own biomedical analysis. Prereq: BIOL 150, BIOL 150L, BIOL 151 and BIOL 151L.

BIOL 275. Undergraduate Research Experience: Insect Behavior. 3 Credits.
This course is an authentic research experience for undergraduates focused on learning the methods used to study animal behavior. Students in the course will participate in collaborative research projects with their teams - each team will design its own unique project focused on the behavior of aphids and their predators/parasitoids. Prereq: BIOL 150, BIOL 150L, BIOL 151, BIOL 151L.

BIOL 291. Seminar. 1-3 Credits.

BIOL 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BIOL 293. Undergraduate Research. 1-5 Credits.

BIOL 294. Individual Study. 1-5 Credits.

BIOL 296. Field Experience. 1-15 Credits.

BIOL 299. Special Topics. 1-5 Credits.

BIOL 315. Genetics. 3 Credits.
Study of the basis of heredity with emphasis on structure and function of DNA and Mendelian genetics. 3 lectures. Cross-listed with PLSC 315. F, S.

BIOL 315L. Genetics Laboratory. 1 Credit.
Study of the basis of heredity with emphasis on structure and function of DNA and Mendelian genetics. 1 two-hour laboratory. Cross-listed with PLSC 315L. F, S.

BIOL 359. Evolution. 3 Credits.
Evolution is the process by which species change over time through descent with modification. This course will focus on understanding the key biological concepts of heritability of traits, variation, adaptation through selection and evolutionary change at all scales. Prereq: BIOL 150, BIOL 151.

BIOL 364. General Ecology. 3 Credits.
Ecological principles associated with organism environment interactions, populations, communities, and ecosystems. Quantitative approach with examples (animal, plant, microbial) included. Prereq: BIOL 150 and BIOL 151.

BIOL 370. Cell Biology. 3 Credits.
Structure and function of cells, including cell surfaces, membranes, organelles, cytoskeleton, cell division, cell physiology, and methods used in cell studies. Prereq: BIOL 150 and BIOL 151.

BIOL 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

BIOL 391. Seminar. 1-3 Credits.

BIOL 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BIOL 393. Undergraduate Research. 1-5 Credits.

BIOL 394. Individual Study. 1-5 Credits.

BIOL 396. Field Experience. 1-15 Credits.

BIOL 399. Special Topics. 1-5 Credits.

BIOL 401. Science Communication. 3 Credits.
Introduction to the principles of communicating scientific issues to the general public and practical application of communication strategies through interpersonal discussion, media, and other means. Cross-listed with COMM 401. Dual-listing: BIOL 601, COMM 601.

BIOL 410. Comparative Chordate Morphology. 3 Credits.
This is a combination lecture/lab course designed to introduce you to the systematics, history, and structure of the chordates, particularly the craniates. Structural and functional similarities and differences among organs and organ systems of representative organisms as well as the use of comparative morphology as a tool to better understand the process of chordate evolution will be emphasized. Prereq: BIOL 150 and BIOL 151.

BIOL 414. Plant Systematics. 3 Credits.
Plant identification, nomenclature and classification are aspects of plant systematics. Modern plant systematics uses molecular approaches in addition to visual traits such as morphology to order plants in accordance with our current understanding of evolution and the 'Tree of Life'. The course includes outdoor activities to learn plant identification as long as the weather permits. Prereq: BIOL 150 and BIOL 151.

BIOL 444. Vertebrate Histology. 3 Credits.
Study of the microscopic anatomy of vertebrate tissues and organs, especially mammals. Classification and identification of epithelium, connective, muscle, and nervous tissue types. Study of these tissues types in the context of major organ systems (circulatory, lymphoid, endocrine, integumentary, digestive, urinary, and respiratory). Prereq: BIOL 150, BIOL 151.

BIOL 450. Invertebrate Zoology. 3 Credits.
Survey of the biology, classification, and evolution of invertebrates. Emphasis on major phyla, marine, and parasitic taxa. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 650.}.

BIOL 452. Ichthyology. 3 Credits.
Biology and taxonomy of fishes. Prereq: BIOL 151. {Also offered for graduate credit - see BIOL 652.}.

BIOL 454. Herpetology. 3 Credits.
Primarily a field and laboratory course focusing on amphibians and reptiles. Students will learn about the biology, ecology, evolution, and life history of reptiles and amphibians utilizing a hands-on approach. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 654.}.

BIOL 456. Ornithology. 3 Credits.
Introduction to the biology, classification, and identification of birds, especially local forms. Early morning field trips required. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 656.}.

BIOL 458. Mammalogy. 3 Credits.
Biology and taxonomy of mammals. Prereq: BIOL 150, BIOL 151. F {Also offered for graduate credit - see BIOL 658.}.

BIOL 460. Animal Physiology. 3 Credits.
Study of the physical and chemical principles that govern cell, tissue, organ, organ system, and organismal function. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 660.}.

BIOL 461. Plant Ecology. 3 Credits.
Ecological structure, processes, and patterns observed with plant communities and populations as influenced by environmental conditions. Illustrations provided with local fieldwork. Prereq: BIOL 150, BIOL 151.{Also offered for graduate credit - see BIOL 661.}.

BIOL 462. Physiological Ecology. 3 Credits.
Study of the physiological mechanisms underlying life-history trade-offs and constraints in an ecological and evolutionary context. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 662.}.

BIOL 463. Animal Behavior. 3 Credits.
Description of the principal behavior patterns of animals with consideration of ecological, evolutionary, and internal mechanisms. Prereq: BIOL 151, BIOL 151L.

BIOL 464. Endocrinology. 3 Credits.
Physiology and anatomy of endocrine glands; chemistry and interrelations of their secretions. Prereq: BIOL 150, BIOL 151, and BIOL 370. {Also offered for graduate credit - see BIOL 664.}.

BIOL 465. Hormones and Behavior. 3 Credits.
Study of the organizational and activational role endocrine systems play in regulating animal behaviors. These studies will be explored within an ecological and evolutionary framework. Prereq: BIOL 150 and BIOL 151. {Also offered for graduate credit - see BIOL 665.}.

BIOL 470. Freshwater Ecology and Limnology. 3 Credits.
Freshwater ecology is the study of the relationship between freshwater organisms and their environment. Limnology is the study of inland waters, including lakes, reservoirs, rivers, streams, wetlands and groundwater. This course will provide an overview of freshwater ecology & limnology, emphasizing fundamental interactions and processes. Prereq: BIOL 150 and BIOL 151. {Also offered for graduate credit - See BIOL 670.}.

BIOL 472. Structure and Diversity of Plants and Fungi. 3 Credits.
We will focus on structure and morphology of plants and fungi, as well as explore the diversity or adaptations plants and fungi have acquired to overcome a variety of environmental and habitat challenges. Prereq: BIOL 150, BIOL 151.

BIOL 475. Conservation Biology. 3 Credits.
Integrative approach to the study and conservation of biodiversity. Application of principles from various sub-disciplines of the biological and social sciences to current conservation problems. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 675.}.

BIOL 476. Wildlife Ecology and Management. 3 Credits.
Application of ecological principles to management of game and non-game wildlife populations. Prereq: BIOL 150 and BIOL 151. {Also offered for graduate credit - see BIOL 676.}.

BIOL 477. Wildlife and Fisheries Management Techniques. 3 Credits.
Students will learn techniques used in the study and management of fish and wildlife populations. Students will design an independent field research project to be executed during a field trip (typically 2-4 days in length). Prereq: BIOL 151. {Also offered for graduate credit - see BIOL 677.}.

BIOL 479. Biomedical Genetics and Genomics. 3 Credits.
This course will cover the diagnoses, clinical presentations, prevention and treatments of hereditary diseases (Mendelian and complex); the ever-increasing roles that genetics and genomics have in advancing medicine (including personalized medicine). Prereq: BIOL 150, BIOL 151 and BIOL 315 or PLSC 315. {Also available for graduate credit - see BIOL 679.}.

BIOL 480. Ecotoxicology. 3 Credits.
Ecotoxicology, the behavior of pollutants in and effects on ecosystems; top-down and bottom-up approaches for assessment/prediction of effects on populations, communities and ecosystems; ecotoxicological testing at single/multi-species levels; biomarkers; passive/active biomonitoring. Prereq: BIOL 151 and BIOL 151L. {Also offered for graduate credit - see BIOL 680.}.

BIOL 481. Wetland Science. 3 Credits.
Definition of wetlands, biogeochemistry, ecophysiology and adaptations to wetland conditions in plants and animals, biodiversity and productivity, wetland ecology, applications of wetlands for treatment of wastewater and other forms of bioremediation. Prereq: BIOL 151, BIOL 151L. {Also offered for graduate credit - see BIOL 681.}.

BIOL 482. Developmental Biology. 3 Credits.
Analysis of the processes of development, with an emphasis on animal development. Topics range from classical embryology to the cellular and molecular basis of development. Prereq: BIOL 150 and BIOL 151. {Also offered for graduate credit - see BIOL 682.}.

BIOL 483. Cellular Mechanisms of Diseases. 3 Credits.
This course will be focused on the cellular and molecular bases of selected diseases and some non-human animal diseases. Key cellular pathways/processes and molecular mechanisms that, when altered/disrupted, result in pathological changes/conditions will be discussed from scientific (e.g., functions, regulation and structures of cells, proteins and organs) and medical (e.g., clinical presentation, diagnostic and treatment) perspectives. Prereq: BIOL 150, BIOL 151, BIOL 315 or PLSC 315, BIOL 370. {Also offered for graduate credit - See BIOL 683.}.

BIOL 491. Seminar. 1-5 Credits.

BIOL 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BIOL 493. Undergraduate Research. 1-5 Credits.

BIOL 494. Individual Study. 1-5 Credits.

BIOL 496. Field Experience. 1-15 Credits.

BIOL 499. Special Topics. 1-5 Credits.

BIOL 601. Science Communication. 3 Credits.
Introduction to the principles of communicating scientific issues to the general public and practical application of communication strategies through interpersonal discussion, media, and other means. Cross-listed with COMM 601. Dual-listing: BIOL 401 and COMM 401.

BIOL 650. Invertebrate Zoology. 3 Credits.
Survey of the biology, classification, and evolution of invertebrates. Emphasis on major phyla, marine, and parasitic taxa. {Also offered for undergraduate credit - see BIOL 450.}.

BIOL 652. Ichthyology. 3 Credits.
Biology and taxonomy of fishes. {Also offered for undergraduate credit - see BIOL 452.}.

BIOL 654. Herpetology. 3 Credits.
Primarily a field and laboratory course focusing on amphibians and reptiles. Students will learn about the biology, ecology, evolution, and life history of reptiles and amphibians utilizing a hands-on approach. {Also offered for undergraduate credit - see BIOL 454.}.

BIOL 656. Ornithology. 3 Credits.
Introduction to the biology, classification, and identification of birds, especially local forms. Early morning field trips required. {Also offered for undergraduate credit - see BIOL 456.}.

BIOL 658. Mammalogy. 3 Credits.
Biology and taxonomy of mammals. {Also offered for undergraduate credit - see BIOL 458.}.

BIOL 660. Animal Physiology. 3 Credits.
Study of the physical and chemical principles that govern cell, tissue, organ, organ system, and organismal function. {Also offered for undergraduate credit - see BIOL 460.}.

BIOL 661. Plant Ecology. 3 Credits.
Ecological structure, processes, and patterns observed with plant communities and populations as influenced by environmental conditions. Illustrations provided with local fieldwork. {Also offered for undergraduate credit - see BIOL 461.}.

BIOL 662. Physiological Ecology. 3 Credits.
Study of the physiological mechanisms underlying life-history trade-offs and constraints in an ecological and evolutionary context. S {Also offered for undergraduate credit - see BIOL 462.}.

BIOL 664. Endocrinology. 3 Credits.
Physiology and anatomy of endocrine glands; chemistry and interrelations of their secretions. {Also offered for undergraduate credit - see BIOL 464.}.

BIOL 665. Hormones and Behavior. 3 Credits.
Study of the organizational and activational role endocrine systems play in regulating animal behaviors. These studies will be explored within an ecological and evolutionary framework. {Also offered for undergraduate credit - see BIOL 465.}.

BIOL 675. Conservation Biology. 3 Credits.
Integrative approach to the study and conservation of biodiversity. Application of principles from various sub-disciplines of the biological and social sciences to current conservation problems. {Also offered for undergraduate credit - see BIOL 475.}.

BIOL 676. Wildlife Ecology and Management. 3 Credits.
Application of ecological principles to management of game and non-game wildlife populations. {Also offered for undergraduate credit - see BIOL 476.}.

BIOL 677. Wildlife and Fisheries Management Techniques. 3 Credits.
Students will learn techniques used in the study and management of fish and wildlife populations. Students will design an independent field research project to be executed during a field trip (typically 2-4 days in length). {Also offered for undergraduate credit - see BIOL 477.}.

BIOL 679. Biomedical Genetics and Genomics. 3 Credits.
This course will cover the diagnoses, clinical presentations, prevention and treatments of hereditary diseases (Mendelian and complex); the ever-increasing roles that genetics and genomics have in advancing medicine (including personalized medicine). {Also available for undergraduate credit - see BIOL 479.}.

BIOL 680. Ecotoxicology. 3 Credits.
Ecotoxicology, the behavior of pollutants in and effects on ecosystems; top-down and bottom-up approaches for assessment/prediction of effects on populations, communities and ecosystems; ecotoxicological testing at single/multi-species levels; biomarkers; passive/active biomonitoring. {Also offered for undergraduate credit - see BIOL 480.}.

BIOL 681. Wetland Science. 3 Credits.
Definition of wetlands, biogeochemistry, ecophysiology and adaptations to wetland conditions in plants and animals, biodiversity and productivity, wetland ecology, applications of wetlands for treatment of wastewater and other forms of bioremediation. {Also offered for undergraduate credit - see BIOL 481.}.

BIOL 682. Developmental Biology. 3 Credits.
Analysis of the processes of development, with an emphasis on animal development. Topics range from classical embryology to the cellular and molecular basis of development. {Also offered for undergraduate credit - see BIOL 482.}.

BIOL 683. Cellular Mechanisms of Disease. 3 Credits.
This course will be focused on the cellular and molecular bases of selected diseases and some non-human animal diseases. Key cellular pathways/processes and molecular mechanisms that, when altered/disrupted, result in pathological changes/conditions will be discussed from scientific (e.g., functions, regulation and structures of cells, proteins and organs) and medical (e.g., clinical presentation, diagnostic and treatment) perspectives. {Also offered for undergraduate credit. See BIOL 483.}.

BIOL 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BIOL 695. Field Experience. 1-15 Credits.

BIOL 696. Special Topics. 1-5 Credits.

BIOL 790. Graduate Seminar. 1-3 Credits.

BIOL 791. Temporary/Trial Topics. 1-5 Credits.

BIOL 793. Individual Study/Tutorial. 1-5 Credits.

BIOL 794. Practicum/Internship. 1-10 Credits.

BIOL 795. Field Experience. 1-15 Credits.

BIOL 796. Special Topics. 1-5 Credits.

BIOL 797. Master's Paper. 1-3 Credits.
Literature review, research, and preparation for paper required for the comprehensive study option. Graded S or U.

BIOL 798. Master's Thesis. 1-10 Credits.

BIOL 820. Advanced Cell Biology. 3 Credits.
In-depth survey of cell biology, including studies of membranes, secretion cytoskeleton, cellular movement organelles, and gene regulation.

BIOL 825. Biology of Aging. 3 Credits.
This course will take an integrative approach to understanding the biology of aging. We will examine both the evolutionary causes and underlying mechanisms of aging in diverse organisms including humans.

BIOL 826. Integrative Organismal Biology. 3 Credits.
This course will take an integrative approach in examining the evolutionary and ecological factors and the physiological mechanisms that contribute to variation among individuals in diverse organisms.

BIOL 842. Quantitative Biology. 3 Credits.
Philosophy and techniques for collecting, handling, and interpreting research data in the biological sciences. S.

BIOL 850. Advanced Ecology. 3 Credits.
This course covers classical ecological literature and current literature focusing on ecological research philosophy and techniques. An overview/introduction of a variety of statistical methods for analyzing ecological data is covered.

BIOL 851. Advanced Conservation Biology. 3 Credits.
This class will cover recent developments in the field of conservation biology, with a specific focus on recent literature. Areas of focus will include Evolutionary Conservation and Conservation Genetics.

BIOL 859. Evolution. 3 Credits.
Evolution is the process by which species change over time through descent with modification. This course will focus on understanding the different applications of evolutionary theory to current issues in the biological sciences.

BIOL 860. Evolutionary Ecology. 3 Credits.
Lecture-discussion course on recent developments in evolutionary theory and their implications in the study of animal adaptation, ecology, and behavior.

BIOL 861. Advanced Physiology - Physiology of Extremes. 3 Credits.
This course will provide a greater understanding of the physiological systems of plants and animals. It exposes students to advanced physiological concepts and current literature perspectives on a variety of physiological systems and processes. This course is designed to increase the student's understanding of the mechanisms involved in the functioning of plant and animals with a specific focus on advanced topics and the physiology of extremes. A basic understanding of plant and animal physiology is expected prior to taking this course, as this course takes an in-depth look at the physiological extremes present in the plant and animal kingdoms.

BIOL 862. Environment and Adaptation. 3 Credits.
Environmental factors and responses evidenced with life-history patterns, genetic variation, population dynamics, species-interactions, and physiological processes.

BIOL 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.

BIOL 865. Biological Rhythms. 3 Credits.
This course will provide a greater understanding of the nature of endogenous time keeping ("clocks") and will investigate A) the biological mechanisms by which these 'clocks' interface with the environment, both biotic (e.g. social behavioral) and abiotic, to B) enable adaptive responses. This class will focus almost exclusively on vertebrates, but may include classic examples and insights gained from plants and invertebrates.

BIOL 866. Advanced Animal Behavior. 3 Credits.
This course investigates current concepts and research areas in animal behavior, with a focus on topics that lie at the interface between animal behavior, ecology and evolution.

BIOL 876. Population Dynamics. 3 Credits.
Principles and mechanics of animal population dynamics. Prereq: an interest in working with numbers.

BIOL 877. Analysis of Population and Demographic Data. 3 Credits.
Contemporary maximum likelihood approaches to estimating abundance, survival, reproduction, and dispersal in free-living populations. Goodness-of-fit and information theory applied to population model selection. Examples from a variety of real populations. Prereq: BIOL 876, STAT 660 or STAT 661, ENT 842.

BIOL 884. Biological Research Principles. 3 Credits.
Discussion, analysis of published research papers, lectures on selected topics, and student research proposal. Prereq: STAT 725.

BIOL 892. Graduate Teaching Experience. 1-6 Credits.

BIOL 893. Individual Study/Tutorial. 1-5 Credits.

BIOL 895. Field Experience. 1-15 Credits.

BIOL 899. Doctoral Dissertation. 1-15 Credits.

Biomedical Engineering (BME)

BME 220. Introduction to Biomedical Engineering. 2 Credits.
This course covers the fundamental concepts in a variety of biomedical engineering topics and applications, including biomechanics, biosensors, biomaterials, biomanufacturing and bio data processing. Prereq: MATH 165 or MATH 146, MATH 128 or MATH 129, and sophomore standing.

BME 790. Graduate Seminar. 1-5 Credits.

BME 793. Individual Study/Tutorial. 1-5 Credits.

BME 795. Field Experience. 1-15 Credits.

BME 797. Master's Paper. 1-3 Credits.

BME 798. Master's Thesis. 1-10 Credits.

BME 892. Graduate Teaching Experience. 1-6 Credits.

BME 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

BME 899. Doctoral Dissertation. 1-15 Credits.

Business Administration (BUSN)

BUSN 130. Basic Skills in Leadership and Personal Marketing. 3 Credits.
This course challenges students to begin the process of developing their leadership abilities and then developing the skills to promote their ideas and persuade others in personal and professional contexts. Grounded in an understanding of the art of leading and influence in various cultures and professions, students will assess their own leadership characteristics, analyze and reflect on leadership in everyday life, and then develop a plan and skills to persuasively present themselves and ideas to others, both personally and professionally. Open to all majors.

BUSN 140. Introduction to Hospitality Business. 3 Credits.
This course provides an overview of the hospitality business, covering its history, components, career opportunities, development, and future trends. Applications to hospitality, such as foodservice, lodging, and travel, are explored. This course is open to students pursuing any major.

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.

BUSN 191. Seminar. 1-5 Credits.

BUSN 194. Individual Study. 1-3 Credits.

BUSN 196. Field Experience. 1-15 Credits.

BUSN 199. Special Topics. 1-5 Credits.

BUSN 211. World Culture and Food Service. 3 Credits.
This course is an exploration of a variety of cultures and foods that demonstrate the influences of demography, geography, history, social traditions, religious beliefs, and other environmental considerations on food, its preparation, service, and symbolism/meaning. This course is open to students pursuing any major.

BUSN 280. Introduction To Business. 3 Credits.
This course provides an overview of the environment of business, legal forms of business, and the major functional areas of business including management, marketing, accounting, and finance. This course is open to students pursuing any major.

BUSN 291. Seminar. 1-3 Credits.

BUSN 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BUSN 294. Individual Study. 1-3 Credits.

BUSN 296. Field Experience. 1-15 Credits.

BUSN 299. Special Topics. 1-5 Credits.

BUSN 318. Taxation in Management Decisions. 3 Credits.
Study of the fundamental concepts of tax implications that result from common business transactions. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. Prereq: ACCT 102 or ACCT 201. Cross-listed with ACCT 318.

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 major or minor and a 2.50 minimum NDSU grade point average.

BUSN 341. Global Business Environment. 3 Credits.
Introduction to the policies, procedures, and institutions impacting the global business environment, including visits to relevant businesses, institutions, and historical sites. This course is taught exclusively as part of an NDSU study abroad experience. Prereq: acceptance into the NDSU College of Business program in Europe. May be repeated for credit.

BUSN 347. Principles of Real Estate. 3 Credits.
Principles and techniques of real estate appraisals, practical application of appraisal principles, and techniques to real property evaluation. Students must be College of Business major or minor and a 2.50 minimum NDSU grade point average. Cross-listed with AGEC 347.

BUSN 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

BUSN 380. Business Analytics: Business Problem Solving with Spreadsheets. 3 Credits.
This course explores spreadsheets as a tool for solving business problems. Prereq: restricted to College of Business major, minor, or certificate 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 major or minor and a 2.50 minimum NDSU grade point average. Cross-listed with COMM.

BUSN 391. Seminar. 1-3 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

BUSN 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BUSN 394. Individual Study. 1-5 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

BUSN 397. Fe/Coop Ed/Internship. 1-4 Credits.

BUSN 399. Special Topics. 1-5 Credits.

BUSN 413. Business Internship. 3 Credits.
Supervised professional experience with an appropriate public or private business. Students must meet standards established by the employer and the College of Business. Restricted to College of Business 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 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 major or minor and a 2.50 minimum NDSU grade point average.

BUSN 440. International Business Law. 3 Credits.
Study of public and private international law as it relates to international business: international contracts and sales; international business organizations; and international trade, tariffs, and agreements. Prereq: BUSN 430. Restricted to College of Business 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 AGEC 474. {Also offered for graduate credit - see BUSN 674.}.

BUSN 487. Managerial Economics. 3 Credits.
Business managers, entrepreneurs, and other executives make a variety of important decisions on a daily basis. These decisions are broad in scope and vary in the length of time for which they are made, ranging from developing a particular pricing promotion to expanding the size of a major production plant. This course will provide students with a better understanding of the economics of such decisions and provide tools that can be used to make better business decisions. Prereq: MGMT 320, ECON 201, ECON 202, MATH 144 or MATH 146 and restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

BUSN 489. Strategic Management. 3 Credits.
Analysis of strategic business issues, and integration of business-related knowledge and cross-functional business principles through experiential exercise. Capstone for all College of Business majors. Prereq: FIN 320, MGMT 320, MRKT 320. Co-req: BUSN 430. Prereq or Coreq: Senior Standing.

BUSN 491. Seminar. 1-5 Credits.

BUSN 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BUSN 494. Individual Study. 1-5 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

BUSN 496. Field Experience. 1-15 Credits.
Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

BUSN 499. Special Topics. 1-5 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

BUSN 640. International Business Law. 3 Credits.
Study of public and private international law as it relates to international business: international contracts and sales; international business organizations; and international trade, tariffs, and agreements. {Also offered for undergraduate credit - see BUSN 440.}.

BUSN 674. Cooperatives. 3 Credits.
Theory, practice, and evaluation of cooperatives including principles, management, marketing, finance, taxes, legal issues, and adjusting to change. Cross-listed with AGEC 674. F, S, Su. {Also offered for undergraduate credit - see BUSN 474.}.

BUSN 690. Graduate Seminar. 1-3 Credits.

BUSN 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BUSN 696. Special Topics. 1-5 Credits.

BUSN 790. Graduate Seminar. 1-3 Credits.

BUSN 791. Temporary/Trial Topics. 1-5 Credits.

BUSN 793. Individual Study/Tutorial. 1-5 Credits.

BUSN 794. Practicum/Internship. 1-8 Credits.

BUSN 795. Field Experience. 1-15 Credits.

BUSN 796. Special Topics. 1-5 Credits.

BUSN 797. Master's Paper. 1-3 Credits.

BUSN 798. Master's Thesis. 1-10 Credits.

Cereal & Food Sciences (CFS)

CFS 194. Individual Study. 1-3 Credits.

CFS 196. Field Experience. 1-15 Credits.

CFS 199. Special Topics. 1-5 Credits.

CFS 210. Introduction to Food Science and Technology. 3 Credits.
Overview of food components, food quality, nutrition, processing, packaging, safety, sanitation laws, sensory evaluation, distribution, and utilization.

CFS 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: MATH 146 or higher. Cross-listing: ABEN 263.

CFS 291. Seminar. 1-3 Credits.

CFS 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CFS 294. Individual Study. 1-5 Credits.

CFS 299. Special Topics. 1-5 Credits.

CFS 370. Food Processing I. 3 Credits.
This course is designed to provide students with an introduction to food processing methods. The course will provide hands-on experience with a focus on basic food processing methods. Recommended Prereq: CFS 210.

CFS 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CFS 391. Seminar. 1-3 Credits.

CFS 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CFS 394. Individual Study. 1-5 Credits.

CFS 397. Fe/Coop Ed/Internship. 1-4 Credits.

CFS 399. Special Topics. 1-5 Credits.

CFS 450. Cereal Technology. 3 Credits.
Discussion of cereal grains, their properties, evaluation, and utilization. {Also offered for graduate credit - see CFS 650.}.

CFS 452. Food Laws and Regulations. 3 Credits.
Regulations, laws, and dynamics governing development of food policy. {Also offered for graduate credit - see CFS 652.}.

CFS 460. Food Chemistry. 3 Credits.
Study of food components including water, carbohydrates, lipids, proteins, vitamins, minerals, and enzymes. Recommended Prereq: CFS 210, CHEM 341, CHEM 341L. {Also offered for undergraduate credit - see CFS 660.}.

CFS 461. Food Chemistry Laboratory. 1 Credit.
Laboratory isolation, observation of characteristics, and quantitation of food components. Recommended Coreq: CFS 460. {Also offered for graduate credit - see CFS 661.}.

CFS 462. Food Ingredient Technology. 3 Credits.
The course will present principles and discuss utilization of food ingredients. It provides chemical and physical nature of food ingredients; functions and effects on chemical, rheological, microbiological, and nutritional properties of foods. Distribution and legislation of food ingredients, sources, properties and their applications will be discussed. This course also will shed light on the molecules that constitute our macro and micro nutrients and will attempt to clarify a number of the food issues using the best evidence available. Prereq or Co-req: CFS 460. {Also offered for graduate credit - See CFS 662.}.

CFS 464. Food Analysis. 3 Credits.
Principles, applications, and practice of methods for quantitative determination of food components. 2 lectures, 1 three-hour laboratory. Prereq: CFS 210. {Also offered for graduate credit - see CFS 664.}.

CFS 470. Food Processing II. 3 Credits.
This course is designed to provide students with an in-depth academic and practical exposure to food processing methods and the food industry. Concepts in quality control systems and sanitation will be discussed. Recommended Prereq: CFS 370. {Also offered for graduate credit - see CFS 670.}.

CFS 471. Food Processing Laboratory. 1 Credit.
Field trips, experiments on freezing, freeze-drying, spray drying, canning, beverage production, water activity measurements, shelf life, and quality control. Recommended Coreq: CFS 470. {Also offered for graduate credit - see CFS 671.}.

CFS 472. Cereal and Food Fermentation. 3 Credits.
This is an advanced course with a focus on topics in food fermentation. This course will integrate principles of food microbiology, biochemistry, and discussion of food fermentation processing. Areas covered include microorganisms involved in fermentation; dairy, meat, vegetable, cereal grain, fruit and unique fermented foods and their processing, and food safety aspects of fermented foods. Prereq: CFS 370 or MICR 350 or MICR 453. {Also available for graduate credit - See CFS 672.}.

CFS 473. Food Safety. 3 Credits.
This is an advanced course for Food and Cereal Science majors interested in food safety. This course will enable students to find, evaluate, and report credible food safety information; and comprehend the complexity of food systems. This course will introduce students to the vast array of chemical, physical and biological foodborne hazards. The course will also re-enforce the concept that no food is 100% safe, and will develop the concepts associated with risk assessment and the principles of foodborne outbreak investigation. Prereq: MICR 350 or MICR 453. {Also offered for graduate credit - see CFS 673.}.

CFS 474. Sensory Science of Foods. 3 Credits.
The science used in the evaluation of flavor, color, and texture of foods. Experiential approaches will be used to evaluate sensory characteristics of foods. Recommended Prereq: STAT 330. {Also offered for graduate credit - see CFS 674.}.

CFS 480. Food Product Development. 3 Credits.
This course is designed to provide students the opportunity to incorporate the basic principles of food science in the theoretical development of food products. (Food Science Capstone) Prereq: CFS 453, CFS 460, CFS 464, CFS 470. {Also offered for graduate credit - see CFS 680.}.

CFS 491. Seminar. 1-5 Credits.

CFS 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CFS 494. Individual Study. 1-5 Credits.

CFS 496. Field Experience. 1-15 Credits.

CFS 499. Special Topics. 1-5 Credits.

CFS 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 AGEC 652. {Also offered for undergraduate credit - see CFS 452.}.

CFS 660. Food Chemistry. 3 Credits.
Study of food components including water, carbohydrates, lipids, proteins, vitamins, minerals, and enzymes. {Also offered for undergraduate credit - see CFS 440.}.

CFS 661. Food Chemistry Laboratory. 1 Credit.
Laboratory isolation, observation of characteristics, and quantitation of food components. Coreq: CFS 660. {Also offered for undergraduate credit - see CFS 461.}.

CFS 662. Food Ingredient Technology. 3 Credits.
The course will present principles and discuss utilization of food ingredients. It provides chemical and physical nature of food ingredients; functions and effects on chemical, rheological, microbiological, and nutritional properties of foods. Distribution and legislation of food ingredients, sources, properties and their applications will be discussed. This course also will shed light on the molecules that constitute our macro and micro nutrients and will attempt to clarify a number of the food issues using the best evidence available. Prereq: CFS 660. {Also available for undergraduate credit - See CFS 462.}.

CFS 664. Food Analysis. 3 Credits.
Principles, applications, and practice of methods for quantitative determination of food components. 2 lectures, 1 three-hour laboratory. Prereq: CFS 660.{Also offered for undergraduate credit - see CFS 464.}.

CFS 670. Food Processing II. 3 Credits.
This course is designed to provide students with an in-depth academic and practical exposure to food processing methods and the food industry. Concepts in quality control systems and sanitation will be discussed. {Also offered for undergraduate credit - see CFS 470.}.

CFS 671. Food Processing Laboratory. 1 Credit.
Field trips, experiments on freezing, freeze-drying, spray drying, canning, beverage production, water activity measurements, shelf life, and quality control. Coreq: CFS 670. {Also offered for undergraduate credit - see CFS 471.}.

CFS 672. Cereal and Food Fermentation. 3 Credits.
This is an advanced course with a focus on topics in food fermentation. This course will integrate principles of food microbiology, biochemistry, and discussion of food fermentation processing. Areas covered include microorganisms involved in fermentation; dairy, meat, vegetable, cereal grain, fruit and unique fermented foods and their processing, and food safety aspects of fermented foods. {Also available for undergraduate credit - See CFS 472.}.

CFS 673. Food Safety. 3 Credits.
This is an advanced course for Food and Cereal Science majors interested in food safety. This course will enable students to find, evaluate, and report credible food safety information; and comprehend the complexity of food systems. This course will introduce students to the vast array of chemical, physical and biological foodborne hazards. The course will also re-enforce the concept that no food is 100% safe, and will develop the concepts associated with risk assessment and the principles of foodborne outbreak investigation. {Also offered for undergraduate credit - see CFS 473.}.

CFS 674. Sensory Science of Foods. 3 Credits.
The science used in the evaluation of flavor, color, and texture of foods. Experiential approaches will be used to evaluate sensory characteristics of foods. {Also offered for undergraduate credit - see CFS 474.}.

CFS 680. Food Product Development. 3 Credits.
This course is designed to provide students the opportunity to incorporate the basic principles of food science in the theoretical development of food products. {Also offered for undergraduate credit - see CFS 480.}.

CFS 690. Graduate Seminar. 1-3 Credits.

CFS 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CFS 695. Field Experience. 1-15 Credits.

CFS 696. Special Topics. 1-5 Credits.

CFS 725. Food Policy. 3 Credits.
Provides quantitative tools and models used to analyze general food safety policies. Three lectures. Prereq: SAFE 670. Cross-listed with AGEC 725 and SAFE 725.

CFS 758. Fundamentals of Flour Testing and Baknq. 3 Credits.
Flour testing, industrial, and experimental bread baking. Production methods, ingredients, and baking reactions. Lectures and laboratories. Prereq: CFS 650.

CFS 759. Milling. 3 Credits.
Experimental and industrial feed and flour milling. Production, equipment, and factors involved in the milling process. Lectures and laboratories. Prereq: CFS 650.

CFS 760. Pasta Processing. 3 Credits.
Durum wheat quality, pasta production, and pasta quality evaluation. Lectures and laboratories. Prereq: CFS 650.

CFS 761. Malting and Brewing. 3 Credits.
Barley and malt quality; malting and brewing. Lectures and laboratories. Prereq: CFS 650.

CFS 764. Carbohydrate Chemistry. 2 Credits.
This course focuses on developing i) knowledge on structural features of carbohydrates and ii) skills for structural characterization of carbohydrates in plants and microorganisms using analytical methods. Recommended prereq: Introductory Chemistry/Biochemistry class.

CFS 765. Advanced Cereal and Food Chemistry I. 4 Credits.
Physiochemical, structural, functional, and analysis of cereal and food carbohydrates and enzymes. Biochemical aspects of these components will also be presented.

CFS 766. Advanced Cereal and Food Chemistry II. 4 Credits.
Physiochemical, structural, and functional properties of cereal and food proteins and lipids in food systems.

CFS 790. Graduate Seminar. 1-3 Credits.

CFS 791. Temporary/Trial Topics. 1-5 Credits.

CFS 792. Graduate Teaching Experience. 1-6 Credits.

CFS 793. Individual Study. 1-5 Credits.

CFS 794. Practicum/Internship. 1-8 Credits.

CFS 795. Field Experience. 1-15 Credits.

CFS 796. Special Topics. 1-5 Credits.

CFS 797. Master's Paper. 1-3 Credits.

CFS 798. Master's Thesis. 1-10 Credits.

CFS 892. Graduate Teaching Experience. 1-6 Credits.

CFS 894. Practicum/Internship. 1-8 Credits.

CFS 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

CFS 899. Doctoral Dissertation. 1-15 Credits.

Chemistry (CHEM)

CHEM 117. Chemical Concepts and Applications. 3 Credits.
Introduction to general and organic chemistry, with applications drawn from the health, environmental, and materials sciences. Prereq or Coreq: MATH 103, MATH 104 or MATH 107 or Math placement.

CHEM 117L. Chem Concepts and Applications Lab. 1 Credit.
Introduction to general and organic chemistry, with applications drawn from the health, environmental, and materials sciences. Prereq or Coreq: MATH 103, MATH 104, MATH 107 or Math placement.

CHEM 121L. General Chemistry I Laboratory. 1 Credit.
Matter, measurement, atoms, ions, molecules, reactions, chemical calculations, thermochemistry, bonding, molecular geometry, periodicity, and gases. Prereq or Coreq: MATH 103 or MATH 107 or Math placement.

CHEM 121. General Chemistry I. 3 Credits.
Matter, measurement, atoms, ions, molecules, reactions, chemical calculations, thermochemistry, bonding, molecular geometry, periodicity, and gases. Prereq or Coreq: MATH 103 or MATH 107 or Math placement.

CHEM 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. Prereq: MATH 103 or MATH 107 or Math placement.

CHEM 151. Principles of Chemistry II. 3 Credits.
Liquids and solids, equilibrium, kinetics, thermodynamics, acids and bases, oxidation-reduction chemistry, electrochemistry. Prereq: CHEM 150.

CHEM 160. Principles of Chemistry Laboratory I. 1 Credit.
Chemistry for students with good high school preparation in mathematics and science. Electronic structure, stoichiometry, molecular geometry, ionic and covalent bonding, energetics of chemical reactions, gases, transition metal chemistry.

CHEM 161. Principles of Chemistry Laboratory II. 1 Credit.
Liquids and solids, equilibrium, kinetics, thermodynamics, acids and bases, oxidation-reduction chemistry, electrochemistry. Prereq: CHEM 160.

CHEM 191. Seminar. 1-5 Credits.

CHEM 194. Individual Study. 1-3 Credits.

CHEM 196. Field Experience. 1-15 Credits.

CHEM 199. Special Topics. 1-5 Credits.

CHEM 240. Survey of Organic Chemistry. 3 Credits.
Structure and bonding, nomenclature; hydrocarbons: alkanes, alkenes, alkynes, aromatics; substituted hydrocarbons: alkyl halides, stereochemistry, alcohols, phenols, ethers, amines; carbonyls: aldehydes, ketones; carboxylic acids, esters, amides. Prereq: CHEM 121.

CHEM 291. Seminar. 1-3 Credits.

CHEM 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CHEM 294. Individual Study. 1-5 Credits.

CHEM 299. Special Topics. 1-5 Credits.

CHEM 341L. Organic Chemistry I Laboratory. 1 Credit.
First semester of a two-semester course in organic chemistry for students in sciences and pre-professional curricula. Prereq: CHEM 122L or CHEM 161.

CHEM 341. Organic Chemistry I. 3 Credits.
First semester of a two-semester course in organic chemistry for students in sciences and pre-professional curricula. Prereq: CHEM 122 or CHEM 151.

CHEM 342L. Organic Chemistry II Laboratory. 1 Credit.
Structure and reactivity, named reactions, carbon-carbon bond forming reactions, aromatic and heterocyclic chemistry, biomolecules and polymers, and multi-step synthesis. Prereq: CHEM 341L.

CHEM 342. Organic Chemistry II. 3 Credits.
Structure and reactivity, named reactions, carbon-carbon bond forming reactions, aromatic and heterocyclic chemistry, biomolecules and polymers, and multi-step synthesis. Prereq: CHEM 240 or CHEM 341.

CHEM 353. Majors Organic Chemistry Laboratory I. 1 Credit.
Organic functional group synthesis. Modern analytical tools for functional group analysis and structure determination. Coreq: CHEM 341.

CHEM 354. Majors Organic Chemistry Laboratory II. 2 Credits.
More advanced aspects of organic laboratory operations, synthesis, analysis, and structure determination using spectroscopic techniques. Coreq: CHEM 342.

CHEM 364. Physical Chemistry I. 3 Credits.
Mathematical and physical basis of chemical phenomena. Emphasis on quantum chemistry and spectroscopy. Prereq: CHEM 122 or CHEM 151, MATH 259 or MATH 265, PHYS 252.

CHEM 365. Physical Chemistry II. 3 Credits.
Mathematical and physical basis of chemical phenomena. Emphasis on chemical thermodynamics. Prereq: CHEM 122 or CHEM 151, MATH 259 or MATH 265 and PHYS 252.

CHEM 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CHEM 380. Chemistry Junior Seminar. 1 Credit.
Includes discussion of chemistry topics, technical writing instruction and assignments; participation in senior seminar discussions.

CHEM 391. Seminar. 1-3 Credits.

CHEM 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CHEM 394. Individual Study. 1-5 Credits.

CHEM 397. Fe/Coop Ed/Internship. 1-4 Credits.

CHEM 399. Special Topics. 1-5 Credits.

CHEM 425. Inorganic Chemistry I. 3 Credits.
Electronic structure, ionic and covalent structure and bonding, point groups and symmetry, coordination chemistry, acid-base and redox chemistry. Prereq: CHEM 364. {Also offered for graduate credit - see CHEM 625.}.

CHEM 426. Crystallography/Crystal Chemistry. 2 Credits.
Geometric and space group crystallography. Structure and bonding in common minerals and industrially important solids. Structure-property relationships. Half semester. {Also offered for graduate credit - see CHEM 626.}.

CHEM 427. X-Ray Diffraction. 2 Credits.
Analytical X-ray powder diffraction for qualitative and quantitative analysis of crystalline solids. Crystal structure analysis using powder methods. Introduction to X-ray fluorescence spectrometry. Half semester. {Also offered for graduate credit - see CHEM 627.}.

CHEM 428. Geochemistry. 3 Credits.
Introduction to geochemistry: chemistry of the Earth, groundwater, isotopes, global geochemical cycles, geochemical modeling, and environmental geochemistry. Recommended: CHEM 121 or CHEM 150. Cross-listed with GEOL 428. (alternate years) {Also offered for undergraduate credit - see CHEM 628.}.

CHEM 429. Inorganic Chemistry Laboratory. 2 Credits.
Methods of synthesis and characterization of inorganic and organometallic compounds. Prereq: CHEM 354, CHEM 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 436. Biopolymers and Biocomposites. 3 Credits.
Structure/properties/synthesis of biopolymers, biomaterials and engineered biocomposites derived from plant based materials. An interdisciplinary course designed for undergraduate students. Introduction to science and engineering of converting biorenewable resources into novel biobased materials and products. Introduction to principles and concepts critical to successful design of polymeric biomaterials, coatings, and biocomposites. Understanding environmental impacts through life cycle analysis (LCA). Prereq: CHEM 122 and at least junior standing. Cross-listed with CPM 436 and ME 436. {Also offered for graduate credit - See CHEM 636.}.

CHEM 465. Survey of Physical Chemistry. 4 Credits.
Conceptual approach to physical chemistry including thermodynamics, kinetics, and quantum mechanics. Application of fundamental concepts to the life sciences. 4 lectures. Prereq: MATH 147 or MATH 166 and PHYS 212. {Also offered for graduate credit - see CHEM 665.}.

CHEM 471. Physical Chemistry Laboratory. 2 Credits.
Measurement of thermodynamic and spectroscopic properties of chemical substances, analysis of data. Prereq: CHEM 364.

CHEM 472. Surface Chemistry. 2 Credits.
The object of the course is to enhance the knowledge of experimental and computational techniques in a sub area of physical chemistry. {Also offered for graduate credit - see CHEM 672.}.

CHEM 476. Introduction to Computational Quantum Chemistry. 3 Credits.
This is a mathematically non-rigorous introduction to procedures and capabilities of basic computational quantum chemistry with practical aspects on using common computational chemistry software. Recommended: CHEM 364, CHEM 365. {Also offered for graduate credit - see CHEM 676.}.

CHEM 491. Seminar. 1-5 Credits.

CHEM 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CHEM 493. Undergraduate Research. 1-5 Credits.

CHEM 494. Individual Study. 1-5 Credits.

CHEM 496. Field Experience. 1-15 Credits.

CHEM 499. Special Topics. 1-5 Credits.

CHEM 625. Inorganic Chemistry I. 3 Credits.
Electronic structure, ionic and covalent structure and bonding, point groups and symmetry, coordination chemistry, acid-base and redox chemistry. {Also offered for undergraduate credit - see Chem 425.}.

CHEM 626. Crystallography/Crystal Chemistry. 2 Credits.
Geometric and space group crystallography. Structure and bonding in common minerals and industrially important solids. Structure-property relationships. Half semester. {Also offered for undergraduate credit - see CHEM 426.}.

CHEM 627. X-Ray Diffraction. 2 Credits.
Analytical X-ray powder diffraction for qualitative and quantitative analysis of crystalline solids. Crystal structure analysis using powder methods. Introduction to X-ray fluorescence spectrometry. Half semester. {Also offered for undergraduate credit - see CHEM 427.}.

CHEM 628. Geochemistry. 3 Credits.
Introduction to geochemistry: chemistry of the Earth, groundwater, isotopes, global geochemical cycles, geochemical modeling, and environmental geochemistry. Cross-listed with GEOL 628. (alternate years) {Also offered for undergraduate credit - see CHEM 428.}.

CHEM 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 636. Biopolymers and Biocomposites. 3 Credits.
Structure/properties/synthesis of biopolymers, biomaterials and engineered biocomposites derived from plant based materials. An interdisciplinary course designed for graduate students. Introduction to science and engineering of converting biorenewable resources into novel biobased materials and products. Introduction to principles and concepts critical to successful design of polymeric biomaterials, coatings, and biocomposites. Understanding environmental impacts through life cycle analysis (LCA). Restrictions: A junior standing student can register if accepted to an accelerated graduate program. Cross-listed with CPM 636 and ME 636. {Also offered for undergraduate credit - See CHEM 436.}.

CHEM 665. Survey of Physical Chemistry. 4 Credits.
Conceptual approach to physical chemistry including thermodynamics, kinetics, and quantum mechanics. Application of fundamental concepts to the life sciences. 4 lectures. {Also offered for undergraduate credit - see CHEM 465.}.

CHEM 672. Surface Chemistry. 2 Credits.
The object of the course is to enhance the knowledge of experimental and computational techniques in a sub area of physical chemistry. {Also offered for undergraduate credit - see CHEM 472.}.

CHEM 676. Introduction to Computational Quantum Chemistry. 3 Credits.
This is a mathematically non-rigorous introduction to procedures and capabilities of basic computational quantum chemistry with practical aspects on using common computational chemistry software. {Also offered for undergraduate credit - see CHEM 476.}.

CHEM 690. Graduate Seminar. 1-3 Credits.

CHEM 696. Special Topics. 1-5 Credits.

CHEM 720. Introduction to Chemical Research. 2 Credits.
This course will serve as an introduction to research in the molecular sciences, with the goal to prepare graduate students for a successful graduate research experience and for a future research career in the molecular sciences.

CHEM 724. Chemical Applications of Group Theory. 1 Credit.
Symmetry, point groups, basic theory of mathematical groups, application of group theory to chemical bonding and spectroscopy.

CHEM 725. Advanced Survey of Inorganic Chemistry. 4 Credits.
This course is an advanced survey course in Inorganic Chemistry. It emphasizes structure, electronic and magnetic properties, bonding, and symmetry of inorganic compounds, including organometallic and coordination complexes, and their reactivities. Topics also include main-group chemistry, solid-state materials, Lewis acid-base chemistry, oxidation-reduction reactions, and an introduction to physical methods used to probe the properties and track reactions of inorganic compounds.

CHEM 726. Photochemistry and Photophysics. 4 Credits.
Fundamental principles in photochemistry and photophysics, rules for electronic transitions, energy transfer, electron transfer, photochemical reactions of organic chromophores (carbonyls, alkenes, enones, aromatics), singlet oxygen, photochemistry in organized and constrained media, organic solid state photochemistry, instrumental methods in photophysics, application of photochemistry. Prereq: CHEM 625, CHEM 724.

CHEM 727. Organometallic Chemistry. 3 Credits.
Synthesis, reactivity, and bonding in organometallic compounds. Prereq: CHEM 425 or CHEM 625.

CHEM 728. Physical Methods for Chemical and Biomolecular Research. 2 Credits.
Fundamentals and applications of physical methodologies, with emphasis on spectroscopic methods, used to probe molecular structure and the structural basis of reactivity. Covers optical, chirooptical, vibrational, paramagnetic resonance, and nuclear spectroscopic methods along with their applications to the study of molecular and biomolecular systems. Prereq: CHEM 625 or BIOC 665.

CHEM 729. X-Ray Structure Determination. 2 Credits.
Use of single crystal X-ray diffraction data to determine molecular and crystal structures. Half semester.

CHEM 730. Separations. 2 Credits.
Theory of equilibrium chemistry in aqueous and nonaqueous systems; principles of chromatographic and other separation techniques. Prereq: CHEM 632.

CHEM 732. Advanced Survey of Analytical Chemistry. 4 Credits.
Theoretical basis and application of several modern chemical analysis techniques. The focus will be the application of electrochemistry, chromatography, electrophoresis, and mass spectrometry in the chemical and biochemical analysis.

CHEM 734. Instrumentation Electronics. 5 Credits.
Design and operation of digital and analog circuits used in chemical instrumentation, computer interfacing. Includes laboratory. Prereq: CHEM 632.

CHEM 736. Mass Spectrometry. 2 Credits.
Theory and application of mass spectrometry in analysis, tandem mass spectrometry, ionization techniques. Half semester. Prereq: CHEM 632.

CHEM 741. Physical Organic Chemistry I. 4 Credits.
Principles governing the reactivity of organic compounds and methods for determining reaction mechanisms.

CHEM 742. Physical Organic Chemistry II. 2 Credits.
Aromaticity, electrophilic substitution, Woodward-Hoffman rules. Half semester. Prereq: CHEM 741.

CHEM 743. Reactive Intermediates. 2 Credits.
Radicals, carbenes, nitrenes, arynes, carbenium ions, survey of other reactive intermediates. Half semester. Prereq: CHEM 741.

CHEM 744. Organic Spectroscopy. 2 Credits.
Structure elucidation by spectrometric methods, including infrared, mass spectrometry, UV, and nuclear magnetic resonance. Interpretation of 2-D NMR spectra. Half semester.

CHEM 745. Organic Synthesis. 4 Credits.
Functional group synthesis, synthetic design, stereochemical control. Prereq: CHEM 741.

CHEM 746. Advanced NMR Spectrometry. 2 Credits.
Theory of pulsed FT-NMR, instrumentation, pulse sequences (with emphasis on multipulse experiments), two-dimensional NMR and applications. Half semester. Prereq: CHEM 744.

CHEM 747. Heterocycles. 2 Credits.
Synthesis of heterocycles, aromaticity, organometallic chemistry, nucleosides, natural products. Prereq: CHEM 745.

CHEM 748. Total Synthesis of Natural Products. 2 Credits.
Retrosynthetic analysis, total synthesis, terpenes, alkaloids will be studied. Prereq: CHEM 745.

CHEM 754. Organic Spectroscopy Laboratory. 1 Credit.
Laboratory to accompany 744, with emphasis on NMR techniques. Half semester. Coreq: CHEM 744.

CHEM 759. Advanced Survey of Physical Chemistry. 4 Credits.
Fundamental principles of physical chemistry including quantum chemistry, spectroscopy, molecular thermodynamics, and kinetics.

CHEM 760. Statistical Thermodynamics. 4 Credits.
Macroscopic and microscopic models for the study of equilibrium properties of pure phases and solutions.

CHEM 761. Optical Spectroscopy. 2 Credits.
Theory and practice of modern spectroscopic methods. Emphasis on visible and ultraviolet wavelength ranges. Half semester. Prereq: CHEM 632.

CHEM 763. Kinetics. 2 Credits.
Experimental methods to determine reaction rates, empirical rate laws, transition state theory. Half semester.

CHEM 764. Dynamics. 2 Credits.
Chemical physics of energy transfer and reactive collisions. Half semester. Prereq: CHEM 763.

CHEM 766. Quantum Chemistry I. 4 Credits.
Wave functions and their properties, quantum mechanical behavior of atoms and molecules.

CHEM 767. Quantum Chemistry II. 2 Credits.
Ab initio and semi-empirical methods for the calculation of energetic and structural properties of molecules; computational methods. Half semester. Prereq: CHEM 766.

CHEM 777. Green Chemistry for Graduate Students. 3 Credits.
Green and sustainable chemistry is an area of science of great interest to the global community. The 12 principles of green chemistry which includes topics such as safety, renewable resources for replacement of fossil fuels, toxicity, and catalysis. It teaches a student holistic thinking of how these topics impact our ecosystem. Details of the 12 principles of green chemistry will be exemplified with real world examples. The proposed course on "Green Chemistry" will introduce graduate students to this critical topic and provide a forum to educate them to become better stewards of the planet.

CHEM 790. Graduate Seminar. 1-3 Credits.

CHEM 791. Temporary/Trial Topics. 1-5 Credits.

CHEM 793. Individual Study/Tutorial. 1-5 Credits.

CHEM 794. Practicum. 1-10 Credits.

CHEM 795. Field Experience. 1-15 Credits.

CHEM 796. Special Topics. 1-5 Credits.

CHEM 797. Master's Paper. 1-3 Credits.

CHEM 798. Master's Thesis. 1-10 Credits.

CHEM 890. Seminar. 1-5 Credits.

CHEM 892. Graduate Teaching Experience. 1-6 Credits.

CHEM 899. Doctoral Dissertation. 1-15 Credits.

Civil Engineering (CE)

CE 111. Introduction to Civil Engineering. 1 Credit.
This course is designed to introduce students to the field of civil engineering and to review the disciplines and types of jobs within the field. It also introduces the student to the roles and duties of a professional engineer. Students also work in groups on design projects to illustrate the steps involved in the design-build process.

CE 112. Computer Applications in Civil Engineering. 1 Credit.
This course is designed to introduce students to the use of spreadsheet software, engineering applications, data analysis and basic programming methods to solve civil engineering problems.

CE 194. Individual Study. 1-3 Credits.

CE 196. Field Experience. 1-15 Credits.

CE 199. Special Topics. 1-5 Credits.

CE 204. Surveying. 3 Credits.
Measurements and errors; topographical and construction surveys; vertical and horizontal control methods; field exercises and computation techniques for surveying data; computation of earthwork volumes. 2 one-hour lectures, 1 three-hour laboratory. Prereq: MATH 105.

CE 212. Civil Engineering Graphic Communications. 3 Credits.
Integrating manual drafting and computer-aided drafting/design in one course with emphases on civil engineering practices.

CE 291. Seminar. 1-3 Credits.

CE 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CE 294. Individual Study. 1-5 Credits.

CE 299. Special Topics. 1-5 Credits.

CE 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. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CE 391. Seminar. 1-3 Credits.

CE 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CE 394. Individual Study. 1-5 Credits.

CE 397. Fe/Coop Ed/Internship. 1-4 Credits.

CE 399. Special Topics. 1-5 Credits.

CE 403. Civil Engineering Materials II: Steel, Wood and Polymers. 2 Credits.
Composition, properties, structure, and behavior of steel, wood, and polymeric materials; elastic, plastic, and viscous behavior under various environmental and loading conditions. Prereq: CE 303. {Also offered for graduate credit - see CE 603.}.

CE 404. Reinforced Concrete. 3 Credits.
Principles of design and analysis of reinforced concrete members, flexural and shear design of rectangular and tee beams, serviceability criteria, short and slender columns. 2 one-hour lectures, 1 two-hour session. Prereq: CE 343. F, S.

CE 405. Advanced Reinforced Concrete. 2 Credits.
Development and anchorage of reinforcement, details of reinforcement in flexural members, continuous beams and one-way slabs, slender columns, two-way slabs. 1 one-hour lecture, 1 two-hour session. Prereq: CE 404. F, S {Also offered for graduate credit - see CE 605.}.

CE 408. Water Resources and Supply. 3 Credits.
Hydrologic concepts, development of water supply sources, principles involved in the collection and transportation of water/wastewater/storm runoff, and distribution of water for municipal use. Prereq: CE 309. F, S.

CE 410. Water and Wastewater Engineering. 3 Credits.
Principles of drinking water treatment system design and principles of the design of wastewater treatment, disposal, reuse, and recycling. Prereq: CE 370 or ENVE 412 as a corequisite.. Dual-listing: CE 610.

CE 411. Design of Pre-stressed Concrete. 2 Credits.
Theory and design of pre-stressed concrete structures, pre- and post-tensioning, loss of pre-stress, proportioning of flexural members, deflections. 2 one-hour lectures. Prereq: CE 404. S {Also offered for graduate credit - see CE 611.}.

CE 417. Slope Stability and Retaining Walls. 3 Credits.
Performance and design of retaining walls, sheet pile walls, braced walls, and reinforced earth. Also evaluation and mitigation of unstable earth slopes. Prereq: CE 316. S {Also offered for graduate credit - see CE 617.}.

CE 418. Transportation Engineering. 4 Credits.
Location, analysis, modeling, and design of multi-modal facilities including highways, railways, airports, terminals, harbors, ports, canals, waterways, pipelines, and conveyor systems. 3 one-hour lectures, 1 two-hour session. Prereq: CE 204, ME 221, MATH 259.

CE 419. Pavement Design. 3 Credits.
Design of flexible and rigid pavements including sub-grade, base courses, surface courses; evaluation criteria including soil, climate, traffic, material, drainage; initial and maintenance cost considerations; construction practices. 3 one-hour lectures. Co-req: CE 303. {Also offered for graduate credit - see CE 619.}.

CE 421. Open Channel Flow. 3 Credits.
Geometric and hydraulic properties of open channels, continuity, momentum and energy principles, design of channels, gradually varied flow, critical flow and culvert design. 3 one-hour lectures. Prereq: CE 309. S {Also offered for graduate credit - see CE 621.}.

CE 425. Bridge Evaluation and Rehabilitation. 3 Credits.
Topics include bridge evaluation methodologies, review of bridge codes, behavior of constructed bridges, sources of bridge deterioration, rehabilitation design with advanced composite materials, structural health monitoring. Prereq: CE 343 and CE 404. {Also offered for graduate credit - see CE 625.}.

CE 430. Timber and Form Design. 3 Credits.
Analysis and design of wood structures and concrete formwork. 2 seventy-five minute lectures. Prereq: ME 223.

CE 441. Finite Element Analysis. 3 Credits.
Weak and strong solutions to governing differential equations in bars, boundary conditions, Galerkin approximation, nodal basis functions, shape functions. Beam and two-dimensional problems with triangular and quadrilateral elements. Prereq: CE 343. {Also offered for graduate credit - see CE 641.}.

CE 442. Matrix Analysis of Structures. 2 Credits.
Review of matrix algebra, flexibility and stiffness methods, direct stiffness method, introduction to finite element analysis. 2 lectures. Prereq: CE 343. F, S {Also offered for graduate credit - see CE 642.}.

CE 444. Structural Steel Design. 3 Credits.
Design of metal structures including mechanical behavior of metals; behavior and proportioning of tension and compression members; beams, beam columns, and connections; selection of metal structural systems. 2 one-hour lectures, 1 two-hour session. Prereq: CE 343. F.

CE 445. Advanced Steel Design. 2 Credits.
Analysis and design of metal structures including connections, selection of structural systems. 1 one-hour lecture, 1 two-hour session. Prereq: CE 444. S {Also offered for graduate credit - see CE 645.}.

CE 446. Basic Dynamics of Structures. 3 Credits.
Analysis of single degree of freedom structural systems to harmonic and general dynamic loading, free vibration of multiple degree of freedom systems, modal superposition, earthquake engineering. 3 one-hour lectures. Prereq: CE 343. F {Also offered for graduate credit - see CE 646.}.

CE 447. Stability of Structures. 3 Credits.
Concepts of stability of equilibrium; stability criteria, work, energy and variational methods; elastic buckling of columns, beams, frames, and plates; FE implementations of stability; design of locally unstable sections. Prereq: CE 343. {Also offered for graduate credit - see CE 647.}.

CE 452. Fundamentals of Oil & Gas Pipeline: Design, Operation, Inspection & Maintenance. 3 Credits.
This course introduces the fundamentals to design, operate, inspect, and maintain oil & gas pipelines, including basics for pipeline materials, design, network, construction, measuring and detection technology, maintenance, and repair. Prereq: CE 418. {Also offered for graduate credit - see CE 652.}.

CE 454. Geometric Highway Design. 3 Credits.
Location and design of highways and streets; design controls, elements of design; cross-section design; design of intersections, interchanges, safety appurtenances, and 3R projects. 2 one-hour lectures, 1 two-hour session. Prereq: CE 418. F {Also offered for graduate credit - see CE 654.}.

CE 455. Airport Planning and Design. 2 Credits.
System planning and demand forecasting; siting and configuration of airports; aircraft characteristics; air traffic controls; standards for geometric design, pavement design, drainage and safety. 2 one-hour lectures. Prereq: CE 418. F {Also offered for graduate credit - see CE 655.}.

CE 456. Railroad Planning and Design. 3 Credits.
Rail planning and location analysis, track/rail structure, track layout and control system, locomotives and train resistance, track safety standards and geometrics, terminal design. 3 one-hour lectures. Prereq: CE 418. F {Also offered for graduate credit - see CE 656.}.

CE 457. Pavement Management Systems. 2 Credits.
Pavement design, maintenance, and rehabilitation strategies; planning, budgeting, and programming for pavement management at network and project levels; development, design, and maintenance of pavement management systems. 2 one-hour lectures. Prereq: CE 303.

CE 458. Bituminous Materials and Mix. 3 Credits.
This course presents fundamental knowledge of asphalt material properties, performance requirements, specifications and related test characteristics. Prereq: CE 303 {Also offered for graduate credit - see CE 658.}.

CE 461. Foundation Engineering. 3 Credits.
Performance and selection of the following foundations: shallow, mat, combined pile, and drilled piers. 3 one-hour lectures. Prereq: CE 316. F {Also offered for graduate credit - see CE 661.}.

CE 462. Designing with Geosynthetics. 2 Credits.
Theories, principles, and engineering design using geosynthetic materials for a variety of civil engineering applications. Applications to geotechnical, environmental, transportation, and water resources fields are emphasized. Includes construction issues. Prereq: CE 316. S {Also offered for graduate credit - see CE 662.}.

CE 463. Geotechnical Earthquake Engineering. 3 Credits.
Wave propagation in soils, dynamic properties of soils, cyclic stress-strain behavior of soils, ground response analysis, liquefaction, soil-structure interaction, seismic design of foundations, retaining walls, and seismic slope stability analysis. Prereq: CE 316. {Also offered for graduate credit - see CE 663.}.

CE 464. Advanced Soil Mechanics. 2 Credits.
This course introduces the students to advanced topics in soil mechanics, 1) unsaturated soil mechanics and 2) molecular modeling of clay-fluid interactions, for the design of foundations, retaining walls and slopes for realistic soil moisture conditions. Prereq: CE 316. {Also offered for graduate credit - see CE 664.}.

CE 471. Environmental Nanotechnology. 3 Credits.
This course introduces nanotechnology with special emphasis on environmental science and engineering. Applications and environmental implications of nanotechnology will be discussed from a national and global perspective. Prereq: CE 370 for CE majors and ENVE 360 for ENVE majors. {Also offered for graduate credit - see CE 671.}.

CE 472. Solid and Hazardous Waste Management. 3 Credits.
Solid waste generation and collection methods, landfilling, recycling and resource conservation, circular economy, hazardous waste generation and disposal history, hazardous waste properties, and remediation techniques including biotic and abiotic transformations. Prereq: ENVE 250 or CE 370. {Also offered for graduate credit - see CE 672.}.

CE 474. Groundwater Sustainability Design. 3 Credits.
To study groundwater flow using mathematical, field, and computational methods; to become prepared to design solutions to North Dakota and international groundwater sustainability challenges. Prereq: CE 309. {Also offered for graduate credit - See CE 674.}.

CE 476. Watershed Modeling. 3 Credits.
Concepts of watershed, watershed hydrology, application of GIS tools, DEM-based watershed delineation, watershed hydrologic modeling, state-of-the-art watershed modeling software, and hands-on applications. Prereq: CE 408. {Also offered for graduate credit - see CE 676.}.

CE 477. Applied Hydrology. 3 Credits.
Scope of hydrology, hydrologic cycle and components, runoff volume and peak flow estimation, hydrograph analysis, probabilistic concepts in water resources, flood- frequency analysis, application of risk concepts to hydrological design, flow estimation for ungaged watersheds. Two 75-minute lectures. Prereq: CE 408. F {Also offered for graduate credit - see CE 677.}.

CE 478. Water Quality Management. 3 Credits.
Physical, chemical, biological, hydrological characteristics, and hydrodynamic elements of receiving waters. Characterizations, measurement, and modeling methods of river/streams, lakes/reservoirs, and groundwater systems. 2 one-hour lectures. Prereq: CE 370 for CE students and ENVE 360 for ENVE students. {Also offered for graduate credit - see CE 678.}.

CE 479. Advanced Water and Wastewater Treatment. 3 Credits.
Selected problems in the investigation and design of sewerage systems, water distribution systems, wastewater treatment plants, and water purification plants. 2 one-hour lectures. Prereq: CE 370 and CE 410 for CE majors or ENVE 412 for ENVE majors. {Also offered for graduate credit - see CE 679.}.

CE 483. Contracts and Specifications. 3 Credits.
Formation, interpretation, and termination of engineering contracts. Engineering specifications and drawings. Other legal matters of concern to engineers. 2 one-hour lectures. Prereq: Junior or Senior standing.

CE 486. Nanotechnology and Nanomaterials. 3 Credits.
This course covers principles of nanotechnology, nanomaterials and develops a framework for their understanding. The basic tools of nanotechnology: nanoscale characterization, physics and materials design will be discussed in the context of current technological advances. Prereq or Coreq: Senior standing in Engineering or Sciences. Cross-listed with ME 486. Dual-listing: CE 686.

CE 489. Senior Design. 3 Credits.
An open-ended capstone design project encompassing a number of civil engineering disciplines. Management, business, public policy, and leadership concepts. Importance of professional licensure. 3 one-hour lectures. Prereq: Senior standing. F, S.

CE 491. Seminar. 1-5 Credits.

CE 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CE 493. Undergraduate Research. 1-5 Credits.

CE 494. Individual Study. 1-5 Credits.

CE 496. Field Experience. 1-15 Credits.

CE 499. Special Topics. 1-5 Credits.

CE 603. Civil Engineering Materials II: Steel, Wood and Polymers. 2 Credits.
Composition, properties, structure, and behavior of steel, wood, and polymeric materials; elastic, plastic, and viscous behavior under various environmental and loading conditions. {Also offered for undergraduate credit - see CE 403.}.

CE 605. Advanced Reinforced Concrete. 2 Credits.
Development and anchorage of reinforcement, details of reinforcement in flexural members, continuous beams and one-way slabs, slender columns, two-way slabs. 1 one-hour lecture, 1 two-hour session. F, S {Also offered for undergraduate credit - see CE 405.}.

CE 610. Water & Wastewater Engineering. 3 Credits.
Principles of drinking water treatment system design and principles of the design of wastewater treatment, disposal, reuse, and recycling. F {Also offered for undergraduate credit - see CE 410.}.

CE 611. Design of Pre-stressed Concrete. 2 Credits.
Theory and design of pre-stressed concrete structures, pre- and post-tensioning, loss of pre-stress, proportioning of flexural members, deflections. 2 one-hour lectures. S {Also offered for undergraduate credit - see CE 411.}.

CE 617. Slope Stability and Retaining Walls. 3 Credits.
Performance and design of retaining walls, sheet pile walls, braced walls, and reinforced earth. Also evaluation and mitigation of unstable earth slopes.S {Also offered for undergraduate credit - see CE 417.}.

CE 619. Pavement Design. 3 Credits.
Design of flexible and rigid pavements including sub-grade, base courses, surface courses; evaluation criteria including soil, climate, traffic, material, drainage; initial and maintenance cost considerations; construction practices. 3 one-hour lectures. {Also offered for undergraduate credit - see CE 419.}.

CE 621. Open Channel Flow. 3 Credits.
Geometric and hydraulic properties of open channels, continuity, momentum and energy principles, design of channels, gradually varied flow, critical flow and culvert design. 3 one-hour lectures. S {Also offered for undergraduate credit - see CE 421.}.

CE 625. Bridge Evaluation and Rehabilitation. 3 Credits.
Topics include bridge evaluation methodologies, review of bridge codes, behavior of constructed bridges, sources of bridge deterioration, rehabilitation design with advanced composite materials, structural health monitoring. {Also offered for undergraduate credit - see CE 425.}.

CE 630. Timber and Form Design. 3 Credits.
Analysis and design of wood structures and concrete formwork. 2 seventy-five minute lectures. {Also offered for undergraduate credit - see CE 430.}.

CE 641. Finite Element Analysis. 3 Credits.
Weak and strong solutions to governing differential equations in bars, boundary conditions, Galerkin approximation, nodal basis functions, shape functions. Beam and two-dimensional problems with triangular and quadrilateral elements. F, S {Also offered for undergraduate credit - see CE 441.}.

CE 642. Matrix Analysis of Structures. 2 Credits.
Review of matrix algebra, flexibility and stiffness methods, direct stiffness method, introduction to finite element analysis. 2 lectures. F, S {Also offered for undergraduate credit - see CE 442.}.

CE 645. Advanced Steel Design. 2 Credits.
Analysis and design of metal structures including connections, selection of structural systems. 1 one-hour lecture, 1 two-hour session. S {Also offered for undergraduate credit - see CE 445.}.

CE 646. Basic Dynamics of Structures. 3 Credits.
Analysis of single degree of freedom structural systems to harmonic and general dynamic loading, free vibration of multiple degree of freedom systems, modal superposition, earthquake engineering. 3 one-hour lectures. F {Also offered for undergraduate credit - see CE 446.}.

CE 647. Stability of Structures. 3 Credits.
Concepts of stability of equilibrium; stability criteria, work, energy and variational methods; elastic buckling of columns, beams, frames, and plates; FE implementations of stability; design of locally unstable sections. {Also offered for undergraduate credit - see CE 447.}.

CE 652. Fundamentals of Oil & Gas Pipeline: Design, Operation, Inspection & Maintenance. 3 Credits.
This course introduces the fundamentals to design, operate, inspect, and maintain oil & gas pipelines, including basics for pipeline materials, design, network, construction, measuring and detection technology, maintenance, and repair. {Also offered for undergraduate credit - see CE 452.}.

CE 654. Geometric Highway Design. 3 Credits.
Location and design of highways and streets; design controls, elements of design; cross-section design; design of intersections, interchanges, safety appurtenances, and 3R projects. 2 one-hour lectures, 1 two-hour session. F {Also offered for undergraduate credit - see CE 454.}.

CE 655. Airport Planning and Design. 2 Credits.
System planning and demand forecasting; siting and configuration of airports; aircraft characteristics; air traffic controls; standards for geometric design, pavement design, drainage and safety. 2 one-hour lectures. F{Also offered for undergraduate credit - see CE 455.}.

CE 656. Railroad Planning and Design. 3 Credits.
Rail planning and location analysis, track/rail structure, track layout and control system, locomotives and train resistance, track safety standards and geometrics, terminal design. 3 one-hour lectures. F {Also offered for undergraduate credit - see CE 456.}.

CE 658. Bituminous Materials and Mix. 3 Credits.
This course presents fundamental knowledge of asphalt material properties, performance requirements, specifications and related test characteristics. {Also offered for undergraduate credit - see CE 458.}.

CE 661. Foundation Engineering. 3 Credits.
Performance and selection of the following foundations: shallow, mat, combined pile, and drilled piers. 3 one-hour lectures. F {Also offered for undergraduate credit - see CE 461.}.

CE 662. Designing with Geosynthetics. 2 Credits.
Theories, principles, and engineering design using geosynthetic materials for a variety of civil engineering applications. Applications to geotechnical, environmental, transportation, and water resources fields are emphasized. Includes construction issues. S {Also offered for undergraduate credit - see CE 462.}.

CE 663. Geotechnical Earthquake Engineering. 3 Credits.
Wave propagation in soils, dynamic properties of soils, cyclic stress-strain behavior of soils, ground response analysis, liquefaction, soil-structure interaction, seismic design of foundations, retaining walls, and seismic slope stability analysis. {Also offered for undergraduate credit - see CE 463.}.

CE 664. Advanced Soil Mechanics. 2 Credits.
This course introduces the students to advanced topics in soil mechanics, 1) unsaturated soil mechanics and 2) molecular modeling of clay-fluid interactions, for the design of foundations, retaining walls and slopes for realistic soil moisture conditions. {Also offered for undergraduate credit - see CE 464.}.

CE 671. Environmental Nanotechnology. 3 Credits.
This course introduces nanotechnology with special emphasis on environmental science and engineering. Applications and environmental implications of nanotechnology will be discussed from a national and global perspective. {Also offered for undergraduate credit - see CE 471.}.

CE 672. Solid and Hazardous Waste Management. 3 Credits.
Solid waste generation and collection methods, landfilling, recycling, and resource conservation, circular economy, hazardous waste generation and disposal history, hazardous waste properties, and remediation techniques including biotic and abiotic transformations. {Also offered for undergraduate credit - see CE 472.}.

CE 674. Groundwater Sustainability Design. 3 Credits.
To study groundwater flow using mathematical, field, and computational methods; to become prepared to design solutions to North Dakota and international groundwater sustainability challenges. {Also offered for undergraduate credit - See CE 474.}.

CE 676. Watershed Modeling. 3 Credits.
Concepts of watershed, watershed hydrology, application of GIS tools, DEM-based watershed delineation, watershed hydrologic modeling, state-of-the-art watershed modeling software, and hands-on applications. {Also offered for undergraduate credit - see CE 476.}.

CE 677. Applied Hydrology. 3 Credits.
Scope of hydrology, hydrologic cycle and components, runoff volume and peak flow estimation, hydrograph analysis, probabilistic concepts in water resources, flood- frequency analysis, application of risk concepts to hydrological design, flow estimation for ungaged watersheds. Two 75-minute lectures. F {Also offered for undergraduate credit - see CE 477.}.

CE 678. Water Quality Management. 3 Credits.
Physical, chemical, biological, hydrological characteristics, and hydrodynamic elements of receiving waters. Characterizations, measurement, and modeling methods of river/streams, lakes/reservoirs, and groundwater systems. 2 one-hour lectures. {Also offered for undergraduate credit - see CE 478 .}.

CE 679. Advanced Water and Wastewater Treatment. 3 Credits.
Selected problems in the investigation and design of sewerage systems, water distribution systems, wastewater treatment plants, and water purification plants. 2 one-hour lectures. {Also offered for undergraduate credit - see CE 479.}.

CE 686. Nanotechnology and Nanomaterials. 3 Credits.
This course covers principles of nanotechnology, nanomaterials and develops a framework for their understanding. The basic tools of nanotechnology: nanoscale characterization, physics and materials design will be discussed in the context of current technological advances. Cross-listed with ME 686. {Also offered for undergraduate credit - see CE 486.}.

CE 690. Graduate Seminar. 1-3 Credits.

CE 695. Field Experience. 1-15 Credits.

CE 696. Special Topics. 1-5 Credits.

CE 701. Theory of Elasticity. 2 Credits.
Theoretical and applied study of the classical theories of plates and shells as they pertain to engineering problems including small displacement of rectangular and circular plates and thin shells. 2 one-hour lectures.

CE 702. Plates and Shells. 2 Credits.
A theoretical study of linear elasticity, Saint Venant's problems, plain stress, plain strain, strain energy, and torsion. 2 one-hour lectures.

CE 706. Plastic Design in Structural Steel. 2 Credits.
Inelastic bending of beams and frames, application of upper and lower bound theorems, calculation of deflection, effect of axial and shearing forces on flexural strength, connections, structural safety, and rules of plastic design. 2 one-hour lectures.

CE 709. Dynamics of Structures and Foundations. 2 Credits.
Advanced topics in structural dynamics, frequency domain response, generalized coordinates, nonlinear structural response, dynamic analysis of framed structures, structures with distributed properties, seismic design considerations. 2 one-hour lectures.

CE 714. Theory of Elastic Stability. 2 Credits.
Bending of beams under simultaneous action of axial and lateral loads, buckling of compressed bars in both the elastic and plastic ranges, design formulas, lateral buckling of beams. 2 one-hour lectures.

CE 720. Continuum Mechanics. 3 Credits.
Tensor analysis in 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 724. Advanced Fluid Mechanics. 3 Credits.
Fundamental principles of fluid mechanics will be introduced using the continuum approach to enable students to understand modern approach to issues in transport phenomena. An attempt is made to bridge the link between mathematical characteristics of the governing equations and the physical interpretation of the phenomena. This course will provide sufficient preparation for advanced graduate study in a number of areas including fluid mechanics, hydraulics, water resources and environmental engineering/science.

CE 725. Biomaterials-Materials in Biomedical Engineering. 3 Credits.
This course covers the fundamentals of synthesis, properties, and biocompatibility of metallic, ceramic, polymeric and composite materials that are designed for replacement of biological materials such as hard and soft tissues.

CE 738. Deep Learning for Engineers. 3 Credits.
This is an introductory course for Deep learning. The students will become familiar with the mathematical background, applications, and limitations of popularly used deep neural network architectures for supervised deep learning tasks. Students will be expected to write codes in standard programming languages. Students without programming experience will be given directed readings and tutorials to cope up with the coding part of this course. Prereq: ENGR 729 Machine Learning for Engineers is the prerequisite for this course. Alternatively, graduate students in any department with good mathematical/ coding/ AI background can request the instructor to waive the prerequisite.

CE 739. Computational Methods for Engineering. 3 Credits.
This course introduces computational methods for graduate students with special emphasis on computational mechanics. Computational methods using High-Performance Computing techniques will be discussed for a wide range of applications. Success in this course requires preexisting familiarity with elementary techniques for solving elementary differential equations. Permission of instructor is required for enrollment.

CE 757. Pavement Evaluation and Rehabilitation. 3 Credits.
Advanced knowledge of pavement performance; pavement evaluation; implementation of pavement management at network and project level; maintenance and rehabilitation strategies; life-cycle-cost analysis.

CE 762. Advanced Foundation Engineering. 2 Credits.
Advanced topics in performance and design of foundations. Current topics include a two-dimensional finite element analysis of the foundation and its supporting soil. 2 one-hour lectures. Prereq: CE 661.

CE 770. Hazardous Waste Site Remediation. 3 Credits.
Overview of hazardous waste issues, classification, legislation, process fundamentals, fate and transport of contaminants, management, and treatment/remediation methods. 3 one-hour lectures. S.

CE 771. Economics of Transportation Systems. 3 Credits.
The course will provide an understanding of transportation economics and policy issues facing society. Topics include transportation demand, model costs, transportation competition and market power, transportation regulation, transportation investment, and the economics of transportation safety. Cross-listed with AGEC 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 AGEC 772.

CE 776. Ground Water and Seepage. 3 Credits.
Groundwater as a resource, relation to hydrologic cycle, well hydraulics, seepage, ground water quality and contamination, ground water flow models. 3 one-hour lectures. S.

CE 778. Transportation Administration. 3 Credits.
Public organization behavior and administration, fund accounting, public budgeting, financial management, and strategic management of transportation agencies. Includes transportation case studies.

CE 779. Watershed Water Quality Modeling. 3 Credits.
Watershed characteristics, non-point source pollution and modeling, latest watershed-scale water quality modeling tools and software, hands-on applications.

CE 780. Transportation Planning. 3 Credits.
Types of transportation planning; history of urban and statewide transportation planning; development and trends in travel demand forecasting; trip generation, trip distribution, mode choice, traffic assignment; transportation plans for modal, and multi-modal alternatives; policy formulation and analysis. 1 three-hour lecture. S.

CE 781. Traffic Engineering. 3 Credits.
Traffic characteristics, studies, and control devices; operations analysis and design; aspects of signing, signalization, markings, and lighting; accident analysis; traffic laws and ordinances; work zone safety practices; arterial and freeway management. 1 three-hour lecture plus two-hour laboratory work. S.

CE 782. Introduction to Intelligent Infrastructure. 3 Credits.
Intelligent infrastructure and associated technologies for sensing, detection, and measurements used in civil infrastructure applications (can be applied to structure, transportation, and geotechnical engineering field).

CE 790. Graduate Seminar. 1-3 Credits.

CE 791. Temporary/Trial Topics. 1-5 Credits.

CE 793. Individual Study/Tutorial. 1-5 Credits.

CE 795. Field Experience. 1-15 Credits.

CE 796. Special Topics. 1-5 Credits.

CE 797. Master's Paper. 1-3 Credits.

CE 798. Master's Thesis. 1-10 Credits.

CE 892. Graduate Teaching Experience. 1-6 Credits.

CE 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

CE 899. Doctoral Dissertation. 1-15 Credits.

Coatings and Polymeric Materials (CPM)

CPM 194. Individual Study. 1-5 Credits.

CPM 196. Field Experience. 1-15 Credits.

CPM 199. Special Topics. 1-5 Credits.

CPM 291. Seminar. 1-5 Credits.

CPM 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CPM 294. Individual Study. 1-5 Credits.

CPM 299. Special Topics. 1-5 Credits.

CPM 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CPM 391. Seminar. 1-3 Credits.

CPM 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CPM 394. Individual Study. 1-5 Credits.

CPM 397. FE/Coop Ed/Internship. 1-4 Credits.

CPM 399. Special Topics. 1-5 Credits.

CPM 436. Biopolymers and Biocomposites. 3 Credits.
Structure/properties/synthesis of biopolymers, biomaterials and engineered biocomposites derived from plant based materials. An interdisciplinary course designed for undergraduate students. Introduction to science and engineering of converting biorenewable resources into novel biobased materials and products. Introduction to principles and concepts critical to successful design of polymeric biomaterials, coatings, and biocomposites. Understanding environmental impacts through life cycle analysis (LCA). Prereq: CHEM 122 and at least junior standing. Cross-listed with CHEM 436 and ME 436. {Also offered for graduate credit - See CPM 636.}.

CPM 451. Laboratory, Chemical, Radiation, and Biological Safety. 1 Credit.
Hazards and safe practices in chemical, radiation and biological laboratories, applicable to all studies at NDSU. Recognized by the University as completion (for credit) of safety training to work in a research laboratory. {Also offered for graduate credit - see CPM 651.}.

CPM 472. Environment and Chemical Industries. 2 Credits.
Environmental issues as they pertain to the chemical industry. Topics to include environmental regulations, the issues with disposal and waste, and designing environmentally compliant processes. Recommended Prereq: CHEM 121. {Also offered for graduate credit - see CPM 672.}.

CPM 473. Polymer Synthesis. 3 Credits.
Chemical synthesis of all types of polymers, including the understanding and tailoring of materials formed by these very high molecular weight molecules. Polymers have unique properties due to their conformation and high molecular mass, and are used in a wide variety of applications from paints to structural, engineering materials. Prereq: CHEM 240 or CHEM 342. {Also offered for graduate credit - see CPM 673.}.

CPM 474. Applied Polymer Science. 3 Credits.
Polymers are used in many important applications such as coatings, adhesives, and composites among others. Beginning with a survey of the main methods of polymer and resin synthesis, the course will emphasize the use of polymers in coatings and other applications including polymer structure - property relationships, formulation concepts, methods of evaluation, and use of solvents. Prereq: CHEM 240 or CHEM 342. {Also offered for graduate credit - see CPM 674.}.

CPM 475. Coatings' Materials Science. 3 Credits.
Materials science of composite materials with a focus on polymeric coatings. Includes properties of component materials, design, testing and application. Specialized topics include corrosion, rheology, appearance science and adhesion. Prereq: CPM 474. {Also offered for graduate credit - see CPM 675.}.

CPM 483. Polymer Practicum. 2 Credits.
Focus on key synthetic methods for polymer synthesis, reaction kinetics, and the characterization methods. Students will be introduced to basic lab skills and the analytical tools used to synthesize and characterize macromolecules. Prereq: CPM 473.) {Also offered for graduate credit - see CPM 683.}.

CPM 484. Coatings I Laboratory. 2 Credits.
Preparation and testing of coatings, synthesis and characterization of resins, characterization of coatings. Laboratory counterpart to CPM 474. Recommended Coreq: CPM 474. {Also offered for graduate credit - see CPM 684.}.

CPM 485. Coatings II Laboratory. 2 Credits.
Formulation and application testing of coatings versus property requirements; color measurement and matching. Laboratory counterpart to CPM 475. 1 six-hour laboratory. Hours flexible. Recommended Prereq: CPM 484. Recommended Coreq: CPM 475. {Also offered for graduate credit - see CPM 685.}.

CPM 486. Corrosion and Materials. 3 Credits.
Corrosion science and engineering: basic electrochemistry of corrosion, measurement of corrosion, choice of materials in engineering design to mitigate corrosion, corrosion control by coatings, evaluation of corrosion protection, and areas of special corrosion problems. Recommended Prereq: CHEM 121 or CHEM 150. Cross-listed with CHEM 486. {Also offered for graduate credit - see CPM 686.}.

CPM 487. Corrosion and Materials Laboratory. 1 Credit.
The laboratory will allow the students to become acquainted with experimental techniques for the study of corrosion processes and the failure of materials. Additionally, the methods for protection of materials will be practiced. Recommended Co-req: CPM 486. {Also offered for graduate credit - see CPM 687.}.

CPM 491. Seminar. 1-5 Credits.

CPM 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CPM 493. Undergraduate Research. 1-5 Credits.

CPM 494. Individual Study. 1-5 Credits.

CPM 496. Field Experience. 1-15 Credits.

CPM 499. Special Topics. 1-5 Credits.

CPM 636. Biopolymers and Biocomposites. 3 Credits.
Structure/properties/synthesis of biopolymers, biomaterials and engineered biocomposites derived from plant based materials. An interdisciplinary course designed for graduate students. Introduction to science and engineering of converting biorenewable resources into novel biobased materials and products. Introduction to principles and concepts critical to successful design of polymeric biomaterials, coatings, and biocomposites. Understanding environmental impacts through life cycle analysis (LCA). Restrictions: A junior standing student can register if accepted to an accelerated graduate program. Cross-listed with CHEM 636 and ME 636. {Also offered for undergraduate credit - See CPM 436.}.

CPM 651. Laboratory, Chemical, Radiation, and Biological Safety. 1 Credit.
Hazards and safe practices in chemical, radiation and biological laboratories, applicable to all studies at NDSU. Recognized by the University as completion (for credit) of safety training to work in a research laboratory. {Also offered for undergraduate credit - see CPM 451.}.

CPM 672. Environment and Chemical Industries. 2 Credits.
Environmental issues as they pertain to the chemical industry. Topics to include environmental regulations, the issues with disposal and waste, and designing environmentally compliant processes. {Also offered for undergraduate credit - see CPM 472.}.

CPM 673. Polymer Synthesis. 3 Credits.
Chemical synthesis of all types of polymers, including the understanding and tailoring of materials formed by these very high molecular weight molecules. Polymers have unique properties due to their conformation and high molecular mass, and are used in a wide variety of applications from paints to structural, engineering materials. {Also offered for undergraduate credit - see CPM 473.}.

CPM 674. Applied Polymer Science. 3 Credits.
Polymers are used in many important applications such as coatings, adhesives, and composites among others. Beginning with a survey of the main methods of polymer and resin synthesis, the course will emphasize the use of polymers in coatings and other applications including polymer structure - property relationships, formulation concepts, methods of evaluation, and use of solvents. {Also offered for undergraduate credit - see CPM 474.}.

CPM 675. Coatings' Materials Science. 3 Credits.
Materials science of composite materials with a focus on polymeric coatings. Includes properties of component materials, design, testing and application. Specialized topics include corrosion, rheology, appearance science and adhesion. Prereq: CPM 674. {Also offered for undergraduate credit - see CPM 475.}.

CPM 683. Polymer Practicum. 2 Credits.
Focus on key synthetic methods for polymer synthesis, reaction kinetics, and the characterization methods. Students will be introduced to basic lab skills and the analytical tools used to synthesize and characterize macromolecules. Prereq: CPM 673. {Also offered for undergraduate credit - see CPM 483.}.

CPM 684. Coatings I Laboratory. 2 Credits.
Preparation and testing of coatings, synthesis and characterization of resins, characterization of coatings. Laboratory counterpart to CPM 674. Recommended Coreq: CPM 674. {Also offered for undergraduate credit - see CPM 484.}.

CPM 685. Coatings II Laboratory. 2 Credits.
Formulation and application testing of coatings versus property requirements; color measurement and matching. Laboratory counterpart to CPM 675. 1 six-hour laboratory. Hours flexible. Recommended Prereq: CPM 684. Recommended Coreq: CPM 675.{Also offered for undergraduate credit - see CPM 485.}.

CPM 686. Corrosion and Materials. 3 Credits.
Corrosion science and engineering: basic electrochemistry of corrosion, measurement of corrosion, choice of materials in engineering design to mitigate corrosion, corrosion control by coatings, evaluation of corrosion protection, and areas of special corrosion problems. Cross-listed with CHEM 686. {Also offered for undergraduate credit - see CPM 486.}.

CPM 687. Corrosion and Materials Laboratory. 1 Credit.
The laboratory will allow the students to become acquainted with experimental techniques for the study of corrosion processes and the failure of materials. Additionally, the methods for protection of materials will be practiced. Recommended Co-req: CPM 686. {Also offered for undergraduate credit - see CPM 487.}.

CPM 690. Graduate Seminar. 1 Credit.

CPM 695. Field Experience. 1-15 Credits.

CPM 696. Special Topics. 1-5 Credits.

CPM 771. Modern Methods of Polymer Characterization. 3 Credits.
Understanding the physical properties of polymers and methods for their characterization. Focusing on the significance and interplay of physical parameters and the underlying physics of the characterization methods.

CPM 773. Organic Chemistry Of Coatings. 3 Credits.
Synthesis of polymers used in coating systems, polymers having tailored and defined architectures; crosslinking reactions used in coatings. Recommended Prereq: CHEM 741.

CPM 775. Color And Appearance. 3 Credits.
Topics in color and appearance in coatings, Colorimetry, Color and Gloss Measurement, Optical Properties of Pigments, Opacity, CIE and LAB Color Spaces, Color Matching. Recommended Prereq: CPM 675.

CPM 776. Computational Characterization of Materials and Experimental Design. 3 Credits.
The course includes introduction to cheminformatics and computational chemistry methods to analyze, predict properties and design new chemicals, polymeric and nano- and hybrid materials. The study of computational chemistry approaches together with cheminformatics encompasses the design, creation, organization, management, retrieval, analysis, dissemination, visualization and utilization of chemical information. The primary goal of this course is to teach students how to solve chemical problems computationally and analyze properties. Experimental design methods in relation to chemical experiments also will be given as an important part of chemical information use to obtain and treat experimental data effectively. Prereq: CPM 675 or CPM 636 or CHEM 636 or ME 636.

CPM 778. Physical Chemistry of Polymers. 3 Credits.
Examines the interrelationships among polymer structure, morphology, physical state and properties. Key aspects include molecular weight, and its distribution, and the organization of the atoms along the polymer chain. Recommended Prereq: CPM 673.

CPM 782. Applied Polymer Colloid Science. 3 Credits.
Thermodynamics of interfaces, transport in coatings, colloid stability, advanced CPVC concepts, film formation, particle size effects, and theories of coating application methods. Coreq: CPM 674 (recommended).

CPM 786. Polymeric Materials Design. 3 Credits.
Utilization of organic, polymer and supramolecular chemistry principles for synthesis and modification of polymeric materials for applications in materials science, surface coatings, nanotechnology, engineering and biomaterials design. Prereq: CPM 673 or equivalent.

CPM 787. Sustainable Product Design. 3 Credits.
Scientists and engineers can fundamentally change the environmental footprint of modernity. To make an effective change, they require tools to identify "better" materials and product designs. This course examines the use of life cycle thinking as well as environmental and cost assessment tools to identify product and system design options that balance environmental and economic performance. Special focus of the course will be on the production of chemicals and polymeric materials. Recommended Prereq: CHEM 121.

CPM 788. Bioinspired Coatings. 3 Credits.
This course deals with the foundational concepts of surface coatings inspired by biological species, including but not limited to lotus leaves, rose petals, butterflies, moths, water striders, cicadas, springtails, and sharks. Emphasis is given to the unique surface functionalities associated with these biological species and the underlying surface composition and morphology. The fundamental understanding will be used to design and fabricate coatings exhibiting varying and tunable wettability for a wide variety of applications such as liquid and colloidal phase separations, microfluidics, spill and stain resistant surfaces, de-icing, anti-fogging, and corrosion and fouling protection. Prereq: CPM 675.

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 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

CPM 899. Doctoral Dissertation. 1-15 Credits.

College of Health Professions (CHP)

Courses

CHP 296. Field Experience. 1-15 Credits.

CHP 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CHP 391. Seminar. 1-5 Credits.

CHP 400. Interprofessional Health Care Practice. 3 Credits.
This course is designed for pharmacy, nursing, allied sciences, and other allied health students focusing on the necessary knowledge, skills, and attitudes to function as an effective member of the health care team. Prereq: PHRM 455 or NUR 341 and 342 or MLS 200 or RC 200 or RS 200. Cross-listed with HNES.

CHP 450. Complementary and Alternative Therapies: An Evidence-Based Approach. 2 Credits.
This course is designed to provide health professions students with an overview of all forms of complementary and alternative medicine (CAM) commonly practiced in the United States. Students will develop knowledge, skills, and practical tools necessary to understand and evaluate CAM, and provide recommendations for appropriate use to patients or other health care professionals. Prereq: NURS 210 with a grade of C or better or PHRM 480 with a grade of C or better. {Also offered for graduate credit - see CHP 650.}.

CHP 479. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CHP 491. Seminar. 1-5 Credits.

CHP 650. Complementary and Alternative Therapies: An Evidence-Based Approach. 2 Credits.
This course is designed to provide health professions students with an overview of each form of complementary and alternative medicine (CAM) commonly practiced in the United States. Students will develop knowledge, skills, and practical tools necessary to understand and evaluate CAM, and provide recommendations for appropriate use to patients or other health care professionals. While specific products will be discussed when appropriate, the emphasis is on broad systems of treatment. Prereq: NURS 210 with a grade of C or better or PHRM 480 with a grade of C or better. {Also offered for undergraduate credit - see CHP 450.}.

Communication (COMM)

COMM 101. Majors and Careers in Communication. 1 Credit.
This course serves as an introduction to the Department of Communication at NDSU. Students will learn more about their major, their career options, and relevant extracurricular opportunities, along with the skills, techniques, and resources that will help them achieve their professional goals.

COMM 110. Fundamentals of Public Speaking. 3 Credits.
Theory and practice of public speaking with emphasis on content, organization, language, delivery, and critical evaluation of messages.

COMM 111. Honors Public Speaking. 3 Credits.
Accelerated theory and practice of public speaking with emphasis on content, organization, language, delivery, and critical evaluation of messages. Equivalent to COMM 110. Prereq: GPA of 3.5 or higher.

COMM 112. Understanding Media and Social Change. 3 Credits.
Exploration of the purpose, function, and impact of media on society.

COMM 114. Human Communication. 3 Credits.
Overview of communication theory with emphasis on information transmission and social influence functions of communication behavior in personal and mediated contexts.

COMM 133. Introduction to Agricultural Communication. 3 Credits.
This course provides an introduction to agricultural communication as a professional field. The course will also provide an overview of career options and professional skills and competencies required of agricultural communications.

COMM 150. Forensic Practice. 1 Credit.
Applied speaking experiences in competitive and non-competitive settings. Speaking experiences in public address, oral interpretation, reader's theatre settings, and competitive debate offered. May be repeated.

COMM 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

COMM 194. Individual Study. 1-3 Credits.

COMM 196. Field Experience. 1-15 Credits.

COMM 199. Special Topics. 1-5 Credits.

COMM 200. Introduction to Media Writing. 3 Credits.
Introduction to writing in the styles and forms required in journalism and strategic communication. Prereq: ENGL 120.

COMM 212. Interpersonal Communication. 3 Credits.
Theory and practice of communication in interpersonal relationships. Includes aspects of self-expression and relationship communication.

COMM 216. Intercultural Communication. 3 Credits.
Exploration of the definition, models, and verbal processes of communication between different cultural groups.

COMM 220. Persuasion. 3 Credits.
Exploration of the role and function of persuasion in personal, professional, and civic life. Provides an overview of critical, rhetorical, and social scientific theories of persuasion.

COMM 245. Introduction to Video Production. 3 Credits.
Creation, critique, and analysis of single camera and mobile video production with special emphasis on news reporting. Prereq: Restricted to Communication majors and minor.

COMM 260. Introduction to Web Design. 3 Credits.
This course aims to orient students to Web concepts, design, presentation, and evaluation. Prereq: CSCI 114, TL 116 or CSCI 160.

COMM 261. Introduction to Web Development. 3 Credits.
Introduces the tools used by Web Development professionals, including HTML, Web editors, imaging software, Javascript, and Acrobat pdf format. Prereq: COMM 260.

COMM 291. Seminar. 1-3 Credits.

COMM 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

COMM 294. Individual Study. 1-5 Credits.

COMM 296. Field Experience. 1-15 Credits.

COMM 299. Special Topics. 1-5 Credits.

COMM 301. Rhetorical Traditions. 3 Credits.
Historical/descriptive examination of rhetorical theory from the classical through modern periods. Restricted to Communication majors and minors.

COMM 303. Sport Communication and New Media. 3 Credits.
The purpose of this course is to understand the role of communication, new media, and emerging technologies in the sports industry including such fields as public relations, media relations, community relations, and promotions. Prereqs: HNES 190 and COMM 200.

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 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 majors and minors.

COMM 313. Multimedia Editing. 3 Credits.
Principles of copy-editing, headline composition, and layout for media publications. Prereq: COMM 200 and restricted to Communication 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 majors and minors.

COMM 316. Conflict Communication. 3 Credits.
Exploration of conflict interaction in business and public sectors; application of negotiation strategies, decision-making, problem-solving, and bargaining. Prereq: Restricted to Communication majors and minors.

COMM 318. Argumentation and Advocacy. 3 Credits.
Theory and process of argumentation with practical experience in preparation and delivery of formal and informal arguments. Prereq: COMM 110. Restricted to Communication majors and minors.

COMM 320. Communication Research Methods. 3 Credits.
Overview and application of basic methods used in communication research. Prereq: Restricted to Communication majors and minors.

COMM 330. Photography for the Media. 3 Credits.
An introduction to digital photography techniques for students who plan to specialize in preparing visual images for print and online media. Prereq: students must be Communication majors or minors.

COMM 340. Social Research Methods. 3 Credits.
Overview of the scientific method, the philosophy of science, and the goals of science. Detailed study of qualitative and quantitative methodologies. Cross-listed with SOC 340.

COMM 341. Social Research Methods Laboratory. 1 Credit.
Laboratory to accompany COMM 340. Provides application of conceptualization, operationalization, sampling methods, qualitative and quantitative research methods, and computer statistical analysis. Cross-listed with SOC 341.

COMM 346. Sports Broadcasting. 3 Credits.
Overview of television sports broadcasting skills with an emphasis on reporting, shooting highlights, anchoring, editing and play-by-play announcing.

COMM 347. Television On-Air Performance. 3 Credits.
Introduction to basic skills required of an on-air television personality, including news and sports anchors, talk show hosts, and on-site production hosts. Prereq: COMM 345.

COMM 362. Principles of Design For Media. 3 Credits.
Introduction to design techniques for the development and publication of a variety of media. Prereq: Restricted to Communication 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.
Introduction to principles, practices, and professional pathways in advertising and public relations. Prereq: COMM 200 and restricted to Communication majors and minors only.

COMM 376. Advertising Creative Strategies. 3 Credits.
Introduces students to creative ideas in advertising and their translation into words and images. Emphasis is on strategic approaches to creative decision-making across all media. Prereq: COMM 375 and students must be Communication majors or minors only.

COMM 377. Media Planning. 3 Credits.
This course introduces students to the basic concepts of media planning and buying. Emphasis is placed on strategic approaches to the media placement process across all forms of media. Prereq: COMM 375 and students must be Communication majors or minors.

COMM 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

COMM 380. Health Communication I. 3 Credits.
This course is designed to introduce students to the field of health communication. Students will learn about models of health communication, doctor-patient communication, designing and implementing health campaigns, and organizational communication in health organizations.

COMM 383. Organizational Communication I. 3 Credits.
Exploration of the theory of management communication practices in organizations. Emphasis on the formal structure and interpersonal aspects of supervisor-subordinate relations. Prereq: Students must be College of Business major or minor and a 2.50 minimum NDSU grade point average. Cross-listed with BUSN 383.

COMM 391. Seminar. 1-5 Credits.

COMM 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

COMM 394. Individual Study. 1-5 Credits.

COMM 396. Field Experience. 1-15 Credits.

COMM 397. Fe/Coop Ed/Internship. 1-4 Credits.

COMM 399. Special Topics. 1-5 Credits.
Restricted to Communication majors and minors.

COMM 401. Science Communication. 3 Credits.
Introduction to the principles of communicating scientific issues to the general public and practical application of communication strategies through interpersonal discussion, media, and other means. Cross-listed with BIOL 401. Dual-listing: BIOL 601, COMM 601.

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 majors and minors.

COMM 421. History of Journalism. 3 Credits.
The history and development of journalism as shaped by the political and social environment.

COMM 425. Specialty Writing. 3 Credits.
Methods and practices of effective written communication in a variety of genres used by advertising and public relations professionals. Prereq: COMM 200 and restricted to Communication 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 majors and minors.

COMM 435. Critical Approaches to Popular Culture. 3 Credits.
Analysis of popular cultures as a reflection and influencer of social values. Explores how media representation, industry, economics, globalization, and the overlap between politics and entertainment affect American popular culture. Restricted to Communication majors and minors.

COMM 442. Digital Media and Society. 3 Credits.
Explores the impact of technological developments on media and mediated culture.

COMM 445. Advanced Video Production. 3 Credits.
Developing advanced skills in the creation, critique, and analysis of video production encompassing news and associated genres, including PSA, commercials, music videos, and documentaries, etc. Prereq: COMM 245.

COMM 446. Television Studio Production. 3 Credits.
This course introduces students to studio and control practices as well as producing and anchoring newscasts and talk shows. Students will learn basic production skills including all areas of studio production by working in Bison Information Network's TV studio. Prereq: COMM 345.

COMM 450. Issues in Communication. 3 Credits.
Studies of key issues in the field of communication. May be repeated. Restricted to Communication majors and minors.

COMM 465. Convergence Media. 3 Credits.
Techniques for digital storytelling, multimedia content creation, and cross-platform production. Restricted to Communication majors or minors only.

COMM 470. Research for Strategic Communication. 3 Credits.
Students in advertising and public relations must respond to changing contexts as they design and conduct campaigns. This course provides tailored strategies needed by our students as they move into the professional advertising and public relations environments. Prereq: COMM 375.

COMM 472. Public Relations Campaigns. 3 Credits.
Social science research as applied to public relations, case study analysis, construction, and implementation of public relations campaigns. Prereq: COMM 375 and restricted to Communication majors and minors and COMM 470 as a prerequisite or corequisite.

COMM 473. Case Study in Public Relations. 3 Credits.
Advanced study of applied public relations theory through intense case study analysis and research focused on organizations. Case studies from the Public Relations Society of America are used. Prereq: COMM 375, COMM 470. Restricted to Communication majors and minors.

COMM 476. Advertising Campaign Practicum. 3 Credits.
This course challenges students to apply the knowledge they have gained in previous advertising classes. Specifically, students will design an advertising campaign including market research, creative execution, media planning, and account management. Prereq: COMM 376 or 377, COMM 470. Restrictions: Restricted to Communication 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 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.

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 majors or minors.

COMM 491. Seminar. 1-5 Credits.
Restricted to Communication professional majors and minors.

COMM 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

COMM 493. Undergraduate Research. 1-5 Credits.

COMM 494. Individual Study. 1-5 Credits.
Restricted to Communication majors and minors.

COMM 496. Field Experience. 1-15 Credits.
Restricted to Communication majors and minors.

COMM 499. Special Topics. 1-5 Credits.
Restricted to Communication majors and minors.

COMM 601. Science Communication. 3 Credits.
Introduction to the principles of communicating scientific issues to the general public and practical application of communication strategies through interpersonal discussion, media, and other means. Cross-listed with BIOL 601. Dual-listing: BIOL 401 and COMM 401.

COMM 690. Graduate Seminar. 1-3 Credits.

COMM 695. Field Experience. 1-15 Credits.

COMM 696. Special Topics. 1-5 Credits.

COMM 700. Research Methods in Communication. 3 Credits.
Introduction to research planning and design, methods of research, and presentation of research results.

COMM 701. Advanced Research Methods in Communication I. 3 Credits.
Advanced research methods in communication; research planning, design, and presentation. Prereq: COMM PhD students only.

COMM 702. Introduction to College Teaching in the Humanities and Social Sciences. 3 Credits.
Techniques for effective teaching and assessing learning at the college level. Includes special issues and responsibilities related to college-level teaching.

COMM 704. Qualitative Research Methods in Communication. 3 Credits.
Introduction to theory and practice of qualitative research in communication. Prereq: COMM 700 or COMM 701.

COMM 707. Quantitative Research Methods in Communication. 3 Credits.
Introduction to quantitative research planning and design, methods of research, and presentation of research results. Prereq: COMM 700.

COMM 711. Communication Theory. 3 Credits.
Major theoretical approaches to the study of communication from social scientific and humanistic traditions.

COMM 712. Emerging Trends in Teaching and Learning Online. 3 Credits.
Study of the theory, historical development, and practical applications of the distance / online education movement. Examination of learning theory and instructional design theory, as it relates to online course development.

COMM 715. Theories of Small Group Communication. 3 Credits.
Survey of theoretical constructs of communication in the small group setting. Examination of current methods of research.

COMM 731. Communication Ethics Seminar. 3 Credits.
Study of ethical theories and their relationship to the mass media.

COMM 735. Theories of Media, Technology, and Society. 3 Credits.
This course examines social scientific and critical theories of media, communication technology, and social change.

COMM 750. Advanced Issues in Communication. 3 Credits.
Advanced theory and philosophy of research issues in the field of communication. May be repeated.

COMM 767. Rhetorical Criticism. 3 Credits.
Survey of critical methods of inquiry that may be applied to oral discourse and frameworks for critically evaluating communication processes and products.

COMM 783. Advanced Organizational Communication I. 3 Credits.
Exploration of the theory of management communication practices in organizations. Emphasis on the formal structure of and interpersonal aspects of supervisor-subordinate relations. Prereq: Graduate standing.

COMM 786. Risk Communication. 3 Credits.
Explores the relationship between communication strategies and risk perception, assessment, and management. Cross-listed with SAFE 786.

COMM 790. Graduate Seminar. 1-3 Credits.

COMM 791. Temporary/Trial Topics. 1-5 Credits.

COMM 792. Graduate Teaching Experience. 1-6 Credits.

COMM 793. Individual Study/Tutorial. 1-5 Credits.

COMM 794. Practicum. 1-15 Credits.

COMM 795. Field Experience. 1-15 Credits.

COMM 796. Special Topics. 1-5 Credits.

COMM 797. Master's Paper. 1-3 Credits.

COMM 798. Master's Thesis. 1-10 Credits.

COMM 799. Master's Examination. 1-6 Credits.
Literature review, research and preparation for the master's examination option.

COMM 892. Graduate Teaching Experience. 1-6 Credits.

COMM 893. Individual Study/Tutorial. 1-5 Credits.

COMM 894. Practicum/Internship. 1-8 Credits.

COMM 899. Doctoral Dissertation. 1-15 Credits.

Community Development (CED)

CED 709. Foundations in Community Development. 3 Credits.
Introduces students in the on-line Master's degree program in community development to the on-line classroom environment, and to the science, practice, and profession of community development.

CED 711. Principles and Strategies of Community Change. 3 Credits.
Analyze theories, principles, strategies and practices of community change and development from a multidisciplinary perspective in order to construct a personal framework for the practice of community economic development. Prereq: CED 709.

CED 713. Community Development II: Organizing for Community Change. 3 Credits.
An examination of the role of civil society in community planning efforts, the connection between social relationships and economic activity, the structure and implications of power, conflict management, inclusiveness, and equitable change. Prereq: CED 709.

CED 715. Community Analysis: Introduction to Methods. 3 Credits.
An introduction to the research methods relevant to community development, strategies for reporting and applying findings in community action, and issues of research ethics and inclusiveness. Prereq: CED 709.

CED 717. Community and Regional Economic Policy and Analysis. 3 Credits.
Explores theories of economic growth, community economic and industrial base, sources of economic growth or decline, and strategies for local and regional economic development. Prereq: CED 709.

CED 719. Community Natural Resource Management. 3 Credits.
Theoretical frameworks, methodological investigation, and applied practices of natural resource development as a component of community economic development. Prereq: CED 709.

CED 721. Introduction to Native Community Development. 3 Credits.
Examines community development in the context of diverse tribal structures and cultures, and provides a holistic analysis of the unique histories and jurisdictional considerations of Native communities. Prereq: CED 709.

CED 723. Building Native Community/Economic Capacity. 3 Credits.
Non-Western approaches to helping Native communities build their economic capacity through participatory, culture-centered, and strength-based approaches to development. Prereq: CED 709.

CED 731. Ecological Economics. 3 Credits.
Examines the synthesis of ecology and economic utility through the inherent interdependence, jointness, and potential complementarity between the ecology and economy of a place. Prereq: CED 709.

CED 733. Sustainable Communities. 3 Credits.
Links the management of natural capital in communities and society to their implications for community sustainability in terms of economic vitality, social well-being, and ecosystem health. Prereq: CED 709.

CED 741. Economic Development Strategies and Programs. 3 Credits.
This course covers the most widely used strategies and programs for economic development within an action planning process, including retention and expansion of business and industry, retail development, downtown revitalization, incubating new firm creation, industrial attraction, and tourism development. Prereq: CED 709.

CED 745. Land Management Planning. 3 Credits.
Examines the principles and practices of real estate, including legal, economic, and social implications from the viewpoint of real estate practicioners, investors, and society. The course covers land use programs and methods of zoning. Prereq: CED 709.

CED 752. Basic Grant Development and Management. 3 Credits.
Introduces the grant development and management process, explores steps in the search for funding sources, examines program budgets and justifications, and lists plans for program sustainability. Prereq: CED 709.

CED 753. Not-for-profit Management. 3 Credits.
This course examines the unique management issues faced by not-for-profit community economic development organizations in terms of policy setting, participation, administration, and accountability. Prereq: CED 709.

CED 755. Community Leadership and Capacity Building. 3 Credits.
This course defines and applies leadership strategies to the community economic development context. The course examines the link between leadership and community capacity. Prereq: CED 709.

CED 756. Community Engagement. 3 Credits.
Provides foundational knowledge of community engagement, including community change readiness assessment, goal determination, and strategies to achieve change. Prereq: Students must be admitted to the GP-IDEA Community Development Master's degree program or have permission from the instructor.

CED 758. Evaluation of Organizations and Programs. 3 Credits.
Introduction to philosophy, techniques, and methodologies of organizational and program evaluation. Topics include overview of program evaluation and theory, techniques to evaluate program progress and performance, evaluation designs, assessing program efficiency, models to diagnose organizations, and methods to assess program performance. Prereq: Students must be admitted to the GP-IDEA Community Development Master's degree program or have permission from the instructor.

CED 761. Government, Politics, & Community Development. 3 Credits.
Introduction to classical and contemporary concepts of federalism, public administration, public policy, and politics with an emphasis on their bearing on community development activities and outcomes.

CED 763. Immigrants and Communities. 3 Credits.
Using current scholarship and primary data gathered by the students, this course examines community-immigrant interaction and how it influences community development and the human capital of immigrant inclusion. Prereq: The course is open first to students in the GP-IDEA Community Development program and secondly to other graduate students with the permission of the instructor.

CED 790. Graduate Seminar. 1-5 Credits.

CED 793. Individual Study/Tutorial. 1-5 Credits.

CED 798. Master's Thesis. 1-10 Credits.

Computer Science (CSCI)

CSCI 105. Introduction to Cybersecurity. 3 Credits.
This course provides the foundation for understanding key issues faced and measures associated with protecting computer systems, networks, and information assets from cyber threats. Students also gain knowledge of the social, legal, ethical, and privacy implications of cybersecurity.

CSCI 114. Computer Applications. 3 Credits.
General introduction to computer concepts, operating systems, the internet, word processing, spreadsheets, database management, and presentation software. Credit awarded only for CSCI 114 or CSCI/MIS/TL 116, not both.

CSCI 122. Visual BASIC. 3 Credits.
Introduction to programming in the BASIC/Visual BASIC language.

CSCI 159. Computer Science Problem Solving. 3 Credits.
Computer-based problem solving techniques are introduced in the context of the Internet, including web-site development. Programming concepts, data structures and algorithms, as well as modeling techniques are discussed.

CSCI 160. Computer Science I. 4 Credits.
Introduction to computer science including problem solving, algorithm development, and structured programming in a high-level language. Emphasis on design, coding, testing, and documentation of programs using accepted standards of style. Prereq: MATH 105 or higher, or CSCI 159.

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 177. Introduction to Information Technology. 3 Credits.
Introduction to basic concepts of information technology, including hardware, software and software. The course provides an overview of computing, storage, networking, and security topics.

CSCI 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

CSCI 194. Individual Study. 1-3 Credits.

CSCI 196. Field Experience. 1-15 Credits.

CSCI 199. Special Topics. 1-5 Credits.

CSCI 212. Self-Paced C++. 1 Credit.
Introduction to the C++ programming language. Students complete exercises and programming assignments at their own pace. Prereq: Programming skill in another language.

CSCI 213. Modern Software Development. 3 Credits.
This course provides students with exposure to, and practice with, a modern software development environment. Students do individual projects covering all the major phases of prescriptive software development including: requirements engineering, design, construction, testing and debugging. Prereq: CSCI 161 or CSCI 228.

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 or CSCI 228.

CSCI 227. Computing Fundamentals in Python I. 3 Credits.
Introduction to programming concepts, with focus on flow control, basic data structures, and functions. The course is the first in a three-course sequence using the Python programming language. Coreq: MATH 103 or MATH 107.

CSCI 228. Computing Fundamentals in Python II. 3 Credits.
Introduction to programming concepts, with focus on the object-oriented programming paradigm, linear data structures, positional lists, iterators, and basic algorithm analysis. The course is the second in a three-course sequence using the Python programming language. Prereq: CSCI 227.

CSCI 229. Computing Fundamentals in Python III. 3 Credits.
Introduction to programming concepts, with focus on data structures and algorithms, including trees, search trees, hash tables, sorting algorithms, and graphs. The course is the third in a three-course sequence using the Python programming language. Prereq: CSCI 228.

CSCI 277. Introduction to UNIX. 3 Credits.
This course introduces students to the UNIX operating system environment. Topics include basic UNIX commands, operating system installation and administration, application installation, use of alternative shells, web servers, and system security. Cross-listed with MIS 277.

CSCI 291. Seminar. 1-3 Credits.

CSCI 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CSCI 294. Individual Study. 1-5 Credits.

CSCI 299. Special Topics. 1-5 Credits.

CSCI 305. Principles of Cybersecurity. 3 Credits.
This course helps students become familiar with cybersecurity concepts, principles, terminology, technologies, and skills. Major security topics covered include threats, malware attacks, hacking, spyware, firewalls, network defense, database security, intrusion detection systems, security policies. Additionally, students learn about cyberstalking, cyber terrorism, and information warfare. Prereq: CSCI 161 or CSCI 312.

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. Credit awarded only for CSCI 312 or CSCI 372, not both. Prereq: CSCI 228.

CSCI 313. Software Development with Frameworks. 3 Credits.
This course provides students with an understanding of the full-stack development of real-world software application using software frameworks. Students will work in small teams to use an agile methodology to develop a full-stack application. Prereq: CSCI 161.

CSCI 336. Theoretical Computer Science. 3 Credits.
Parsing techniques, context-free languages, Turing machines, recursive and recursively enumerable languages, unrestricted grammars, unsolvable decision problems, computability, introduction to computational complexity. Prereq: CSCI 222.

CSCI 345. Topics on Personal Computers. 3 Credits.
Exploration of some aspects of personal computers not covered in other courses, varies each time it is offered. May be repeated. Prereq: CSCI 161.

CSCI 359. Networking. 3 Credits.
This course introduces students to the functionality and operations of networking. It covers the operations of networking equipment, such as hubs, switches, routers, access points and firewalls. Students will also learn about the OSI and TCP/IP models, ports, routing protocols and common networking services.

CSCI 366. Database Systems. 3 Credits.
Introduction to database systems, including database design, data modeling, storage structures, database theory, and the building of database applications. Prereq: CSCI 161.

CSCI 371. Web Scripting Languages. 3 Credits.
This course examines Scripting Languages and their applications. Emphasis will be placed on web scripting. A representative set of scripting languages will be covered. Prereq: CSCI 122 or CSCI 160 or CSCI 227 or ECE 173. Cross-listed with MIS 371.

CSCI 372. Comparative Programming Languages. 3 Credits.
Fundamental concepts of programming languages and inherent design choices are analyzed. The course focuses mainly on concepts of block-structured and object-oriented languages, but other languages, such as declarative and functional languages, also are discussed. Credit awarded only for CSCI 312 or CSCI 372, not both. Prereq: CSCI 161.

CSCI 374. Computer Organization and Architecture. 3 Credits.
This course provides an overview of the fundamentals of computer organization (physical design) and architecture (logical design) and relates this to contemporary design issues. Topics include machine level representation of data, assembly level organization, memory system organization and architecture, system connection, memory, input/output, instruction sets, CPU structure and functions and the control unit operation. Prereq: CSCI 160 or CSCI 227.

CSCI 377. Information Technology. 3 Credits.
Fundamental concepts of managing information technology, including installation, configuration, and maintenance tasks. Topics include management of network connectivity, storage, security, and logs. Data storage systems, virtualized systems, and enterprise systems, such as customer relationship management systems, are considered. Prereq: CSCI 277.

CSCI 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CSCI 391. Seminar. 1-3 Credits.

CSCI 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CSCI 394. Individual Study. 1-5 Credits.

CSCI 396. Field Experience. 1-15 Credits.

CSCI 397. Fe/Coop Ed/Internship. 1-4 Credits.

CSCI 399. Special Topics. 1-5 Credits.

CSCI 403. Defensive Network Security. 3 Credits.
This course will cover the design, development and testing of network and software systems for defending computer systems and networks. Key areas of focus will be the development of secure software, software and software system decision making to ensure security and the use of software systems to protect and detect intrusions into computer networks. Prereq: CSCI 213 or ECE 275 or ME 213. {Also offered for graduate credit - See CSCI 603}.

CSCI 404. Ethical Hacking. 3 Credits.
This course teaches students how to test systems by viewing systems security from the bad actors' perspective in conducting system testing. The course prepares students to take the EC Council Certified Ethical Hacker examination. {Also offered for graduate credit - See CSCI 604.}.

CSCI 408. Malware Detection, Analysis and Threat Mechanisms. 3 Credits.
This course introduces students to the threats posed by malware and how to detect and combat it. Students will learn about how malware functions and study the techniques that are used to detect it. They will also learn about reverse engineering tools and techniques that can be used analyze malware. Prereq: CSCI 359. {Also offered for graduate credit - see CSCI 608.}.

CSCI 409. Cybersecurity Law and Policy. 3 Credits.
This course will cover the laws and policy related to cybersecurity. This will include law and policy at the international, national and state levels. The impact of national and state law on corporate and institutional policies will be discussed and institutional policy development and implementation will be reviewed. Prereq: CSCI 213 or ECE 275 or ME 213. {Also offered for graduate credit - See CSCI 609}.

CSCI 410. Computer Crime and Forensics. 3 Credits.
This course covers the basic types of computer crimes. It introduces principles, techniques, tools, and practical skills necessary to perform rudimentary investigations of incidents in which computers play a significant or interesting role. Prereq: CSCI 161. {Also offered for graduate credit - see CSCI 610.}.

CSCI 411. Secure Software Development. 2 Credits.
Presents an approach to secure software systems design and development that tightly integrates security and systems design and software development (software engineering) together. It addresses the software development process from the perspective of a security practitioner. Prereq: CSCI 313.

CSCI 412. Mobile Software Engineering. 3 Credits.
This course is designed to introduce the student to the best practices of mobile software engineering for developing high-quality, reliable, and secure mobile apps. Prereq: CSCI 213 or CSCI 313.

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 213 and CSCI 313. {Also offered for graduate credit - see CSCI 613.}.

CSCI 416. Software Architecture and Design. 3 Credits.
This course covers both architectural design and module design. Students receive practice in using a set of design patterns to produce software designs with several different types of architecture. Substantial presentation and practice with the UML modeling language are provided. Prereq: CSCI 313.

CSCI 419. Software Testing and Debugging. 3 Credits.
This course covers the goals, principles, practices, evaluations, and limitations of software testing and software debugging. Prereq: CSCI 313.

CSCI 420. Introduction to Data Science in Python. 3 Credits.
This course introduces the foundations of data science. It covers python tools for data acquisition, wrangling, analysis, and visualization. Prereq: CSCI 313 and CSCI 312 or CSCI 372.

CSCI 422. Fundamentals of Data Engineering. 3 Credits.
Learn the fundamentals of data engineering through lectures and hands on work. This cloud centric, project-oriented course will cover the concepts, tools, and skills required in all phases of the data engineering lifecycle, including data sourcing, storage, ingestion, transformation, and serving. Prereq: CSCI 366. {Also offered for graduate credit - see CSCI 622.}.

CSCI 425. Machine Learning. 3 Credits.
Introduction to Machine Learning methods, including supervised and unsupervised learning. Topics will include classification algorithms and unsupervised clustering techniques. Prereq: CSCI 122 or CSCI 160 or CSCI 227 or ECE 173 or ME 213. Dual-listing: CSCI 625.

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. Artificial Intelligence, Ethics, and the Environment. 3 Credits.
After an introduction to the topic of ethics in artificial intelligence, the course focuses on geospatial AI applications, and their ethics implications. The course includes a semester-long project in which students gain technical proficiency and ethical awareness related to geospatial AI. Prereq: CSCI 160. {Also offered for graduate credit - see CSCI 628.}.

CSCI 429. Network Applications and Environments. 3 Credits.
This course is devoted to the study of network services and the development of internet resources. Prereq: CSCI 161 or CSCI 228.

CSCI 430. Quantum Computation. 3 Credits.
Students will master the foundations of quantum computation and quantum information, including underlying physical concepts and practical applications. Topics covered include Quantum Bits (Qubits), Single and Multiple Qubit Gates, Quantum Circuits, Quantum Computation, Quantum Algorithms, and Quantum Computers. Graduate students enrolled will also to gain experience with programming and executing the standard quantum algorithms, such as Fourier Transform, Grover's, Shor's Algorithms using, e.g., IBM Quantum Experience platform. Prereq: PHYS 252. Cross-listed with PHYS 430. Dual-listing: CSCI 630.

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 438. 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 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.
This course will acquaint students with various topics and technologies on cloud computing and provide them with a working knowledge for working and building these systems. Prereq: CSCI 312 or CSCI 372. Dual-listing: CSCI 650.

CSCI 453. Linear Programming and Network Flows. 3 Credits.
Linear programming models and applications, primal and dual formulations, computational procedures; introduction to networks, maximum flow, and shortest path problems. Prereq: MATH 265. {Also offered for graduate credit - see CSCI 653.}.

CSCI 455. Networking and Parallel Computation. 3 Credits.
This course provides students with an understanding of networking and multi-programming. Students will write some multi-programs. Prereq: CSCI 213, CSCI 313 and CSCI 366. {Also offered for graduate credit - See CSCI 655.}.

CSCI 459. Foundations of Computer Networks. 3 Credits.
This is an introduction to fundamental concepts for the design and analysis of broadband networks. Topics include resource allocation, routing, congestion control, medium access, scheduling, and multicast. Concepts are applied to state-of-the-art systems and protocols such as current and future Internet protocols. Prereq: CSCI 374 or ECE 374. {Also offered for graduate credit - see CSCI 659.}.

CSCI 462. Mobile and Wireless Networks. 3 Credits.
This course provides students with an understanding of networking and multi-programming with a focus on mobile and wireless networks. Topics include wireless transmission characteristics, mobility management, wireless local area networks, ad hoc and sensor networks, and cellular networks. Students will write some multi-programs. Prereq: CSCI 313 and CSCI 366. {Also offered for graduate credit - see CSCI 662.}.

CSCI 467. Algorithm Analysis. 3 Credits.
Design, correctness, and analysis of algorithms and data structures. Prereq: MATH 166, CSCI 161 and CSCI 222 or MATH 270. {Also offered for graduate credit - see CSCI 667.}.

CSCI 469. Network Security. 3 Credits.
Cryptography and its application to network and operating system security; authentication; email, web, IP, and wireless security; firewalls and intrusion detection techniques; security threats and countermeasures; legal and ethical issues. Prereq: CSCI 222, CSCI 459, C/C++ or JAVA. {Also offered for graduate credit - see CSCI 669.}.

CSCI 473. Foundations of the Digital Enterprise. 3 Credits.
This course is designed to familiarize individuals with current and emerging electronic commerce technologies using the Internet. Prereq: junior standing.

CSCI 474. Operating Systems Concepts. 3 Credits.
How operating systems manage the resources of a computer. Topics include processes, concurrency, scheduling, deadlocks, memory allocation, virtual and secondary storage. Prereq: CSCI 374 or ECE 374.

CSCI 476. Cloud Systems Administration. 3 Credits.
Concepts of virtualized systems using Linux Containers, KVM and OpenStack. Topics include hypervisor installation, networking and storage, and virtual machine life cycle management, as well as solutions for scalability, monitoring, and performance tuning. Prereq: CSCI 277.

CSCI 477. Object-Oriented Systems. 3 Credits.
Introduction to the concepts and advantages of object-oriented computer systems. Introduces exercises with at least one such language. Prereq: CSCI 372. {Also offered for graduate credit - see CSCI 677.}.

CSCI 479. Introduction to Data Mining. 3 Credits.
Introduction to data mining includes basic data mining techniques, querying, spreadsheet data mining, data warehouses, evaluation techniques, knowledge discovery in databases, examples and a survey of advanced techniques. Prereq: Basic database course (e.g. CSCI 366 or CSCI 468). {Also offered for graduate credit - see CSCI 679.}.

CSCI 485. Autonomous Command and Artificial Intelligence for Robots and Other Cyber-Physical Systems. 3 Credits.
This course will cover the command and control of multi-robot systems. This will include the process of onboard decision making, considering both planning-based and real time decisions. Artificial intelligence techniques for robotic systems will be covered as will the application of similar techniques to non-robot cyber-physical systems. Prereq: CSCI 213 or ECE 275 or ME 213. {Also offered for graduate credit - See CSCI 685.}.

CSCI 488. Human-Computer Interaction. 3 Credits.
Survey of the methodologies and alternatives used in developing and evaluating human-computer interfaces. Prereq: CSCI 313. {Also offered for graduate credit - see CSCI 688.}.

CSCI 489. Social Implications of Computers. 3 Credits.
Capstone course for Computer Science. Presentation and discussion of several ethical and social issues that have arisen from the introduction of the computer including copy-protected software and liability for computer software errors. Prereq: CSCI 312 or CSCI 372. Dual-listing: CSCI 689.

CSCI 491. Seminar. 1-5 Credits.

CSCI 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CSCI 493. Undergraduate Research. 1-6 Credits.

CSCI 494. Individual Study. 1-5 Credits.

CSCI 496. Field Experience. 1-15 Credits.

CSCI 499. Special Topics. 1-5 Credits.

CSCI 603. Defensive Network Security. 3 Credits.
This course will cover the design, development and testing of network and software systems for defending computer systems and networks. Key areas of focus will be the development of secure software, software and software system decision making to ensure security and the use of software systems to protect and detect intrusions into computer networks. {Also offered for undergraduate credit - See CSCI 403}.

CSCI 604. Ethical Hacking. 3 Credits.
This course teaches students how to test systems by viewing systems security from the bad actors' perspective in conducting system testing. The course prepares students to take the EC Council Certified Ethical Hacker examination. {Also offered for undergraduate credit - See CSCI 404.}.

CSCI 608. Malware Detection, Analysis and Threat Mechanisms. 3 Credits.
This course introduces students to the threats posed by malware and how to detect and combat it. Students will learn about how malware functions and study the techniques that are used to detect it. They will also learn about reverse engineering tools and techniques that can be used analyze malware. {Also offered for undergraduate credit - see CSCI 408.}.

CSCI 609. Cybersecurity Law and Policy. 3 Credits.
This course will cover the laws and policy related to cybersecurity. This will include law and policy at the international, national and state levels. The impact of national and state law on corporate and institutional policies will be discussed and institutional policy development and implementation will be reviewed. {Also offered for undergraduate credit - See CSCI 409}.

CSCI 610. Computer Crime and Forensics. 3 Credits.
This course covers the basic types of computer crimes. It introduces principles, techniques, tools, and practical skills necessary to perform rudimentary investigations of incidents in which computers play a significant or interesting role. {Also offered for undergraduate credit - see CSCI 410.}.

CSCI 613. Principles of Software Engineering. 3 Credits.
An introduction to concepts of software engineering. Software development activities through a project. Lifecycle models, requirements, specification, design, implementation, and testing. Software quality, tools, and techniques. {Also offered for undergraduate credit - see CSCI 413.}.

CSCI 616. Software Architecture and Design. 3 Credits.
This course covers both architectural design and module design. Students receive practice in using a set of design patterns to produce software designs with several different types of architecture. Substantial presentation and practice with the UML modeling language are provided. {Also offered for undergraduate credit - see CSCI 416.}.

CSCI 618. Simulation Models. 3 Credits.
Fundamental techniques involved in using a computer to simulate business, social, and industrial systems. Includes principles of random variate generation, statistical sampling, and design of experiments. {Also offered for undergraduate credit - see CSCI 418.}.

CSCI 620. Introduction to Data Science in Python. 3 Credits.
This course introduces the foundations of data science. It covers python tools for data acquisition, wrangling, analysis, and visualization. It also includes hands-on experience through a research project. {Also available for undergraduate credit - see CSCI 420.}.

CSCI 622. Fundamentals of Data Engineering. 3 Credits.
Learn the fundamentals of data engineering through lectures and hands on work. This cloud centric, project-oriented course will cover the concepts, tools, and skills required in all phases of the data engineering lifecycle, including data sourcing, storage, ingestion, transformation, and serving. Dual-listing: CSCI 422.

CSCI 625. Machine Learning. 3 Credits.
Introduction to Machine Learning methods, including supervised and unsupervised learning. Topics will include classification algorithms and unsupervised clustering techniques. {Also offered for undergraduate credit - see CSCI 425.}.

CSCI 628. Artificial Intelligence, Ethics, and the Environment. 3 Credits.
After an introduction to the topic of ethics in artificial intelligence, the course focuses on geospatial AI applications, and their ethics implications. The course includes a semester-long project in which students gain technical proficiency and ethical awareness related to geospatial AI. {Also offered for undergraduate credit - see CSCI 428.}.

CSCI 630. Quantum Computation. 3 Credits.
Students will master the foundations of quantum computation and quantum information, including underlying physical concepts and practical applications. Topics covered include Quantum Bits (Qubits), Single and Multiple Qubit Gates, Quantum Circuits, Quantum Computation, Quantum Algorithms, and Quantum Computers. Graduate students enrolled will also to gain experience with programming and executing the standard quantum algorithms, such as Fourier Transform, Grover's, Shor's Algorithms using, e.g., IBM Quantum Experience platform. Cross-listed with PHYS 630. Dual-listing: CSCI 430.

CSCI 636. Intelligent Agents. 3 Credits.
Fundamentals of Intelligent Agents technology, agent communication languages, applications, and intelligent agents development. {Also offered for undergraduate credit - see CSCI 436.}.

CSCI 641. Introduction to Computer Science Education. 3 Credits.
This course provides an overview of the main areas of Computer Science Education to students. The Active-Learning-Based Teaching Model, Research in Computer Science Education, Teaching Methods in Computer Science Education, and Lab-Based Teaching is addressed. Most of the methods and ideas presented can be easily adapted to the teaching of any computer science topic in any framework and any level, from middle school through high school to the university level.

CSCI 642. Problem Solving in Computer Science Education. 3 Credits.
Introduction of essential Computer-Science concepts related to problem solving through a study of several different approaches. Specific problem-solving techniques such as Sequential Logic, Decision Logic, Looping Logic, and popular data structures are studied in detail. The course will focus on algorithms development and modeling techniques that can be applied to many different programming languages.

CSCI 643. Introduction to Computer Programming. 3 Credits.
The course provides foundational skills to write computer programs in a contemporary programming language. Students will be introduced to computer science 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 644. Data Structures and Algorithms. 3 Credits.
This course introduces data structures and algorithms used in a contemporary programming language. Students will be introduced to linear and hierarchical data structures including arrays, linked lists, stacks, queues and binary trees. Emphasis will be placed on computer science problem-solving, algorithm development and algorithm analysis. Prereq: CSCI 643.

CSCI 650. Cloud Computing. 3 Credits.
This course will acquaint students with various topics and technologies on cloud computing and provide them with a working knowledge for working and building these systems. Dual-listing: 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 655. Networking and Parallel Computation. 3 Credits.
This course provides students with an understanding of networking and multi-programming. Students will write some multi-programs. {Also offered for undergraduate credit - See CSCI 455.}.

CSCI 659. Foundations of Computer Networks. 3 Credits.
This is an introduction to fundamental concepts for the design and analysis of broadband networks. Topics include resource allocation, routing, congestion control, medium access, scheduling, and multicast. Concepts are applied to state-of-the-art systems and protocols such as current and future Internet protocols. {Also offered for undergraduate credit - see CSCI 459.}.

CSCI 662. Mobile and Wireless Networks. 3 Credits.
This course provides students with an understanding of networking and multi-programming with a focus on mobile and wireless networks. Topics include wireless transmission characteristics, mobility management, wireless local area networks, ad hoc and sensor networks, and cellular networks. Students will write some multi-programs. {Also offered for undergraduate credit - see CSCI 462.}.

CSCI 667. Algorithm Analysis. 3 Credits.
Design, correctness, and analysis of algorithms and data structures. {Also offered for undergraduate credit - see CSCI 467.}.

CSCI 669. Network Security. 3 Credits.
Cryptography and its application to network and operating system security; authentication; email, web, IP, and wireless security; firewalls and intrusion detection techniques; security threats and countermeasures; legal and ethical issues. Prereq: CSCI 659, C/C++ or JAVA. {Also offered for undergraduate credit - see CSCI 469.}.

CSCI 675. Operating Systems Design. 3 Credits.
Advanced operating systems topics such as protection, errors, and distributed systems. Case studies of representative operating systems. Students work in small teams to implement their own basic operating systems. {Also offered for undergraduate credit - see CSCI 475.}.

CSCI 677. Object-Oriented Systems. 3 Credits.
Introduction to the concepts and advantages of object-oriented computer systems. Introduces exercises with at least one such language. {Also offered for undergraduate credit - see CSCI 477.}.

CSCI 679. Introduction to Data Mining. 3 Credits.
Introduction to data mining includes basic data mining techniques, querying, spreadsheet data mining, data warehouses, evaluation techniques, knowledge discovery in databases, examples and a survey of advanced techniques. Prereq: Basic database course (e.g. CSCI 668 or CSCI 765). {Also offered for undergraduate credit - see CSCI 479.}.

CSCI 685. Autonomous Command and Artificial Intelligence for Robots and Other Cyber-Physical Systems. 3 Credits.
This course will cover the command and control of multi-robot systems. This will include the process of onboard decision making, considering both planning-based and real time decisions. Artificial intelligence techniques for robotic systems will be covered as will the application of similar techniques to non-robot cyber-physical systems. {Also available for undergraduate credit - See CSCI 485.}.

CSCI 688. Human-Computer Interaction. 3 Credits.
Survey of the methodologies and alternatives used in developing and evaluating human-computer interfaces. {Also offered for undergraduate credit - see CSCI 488.}.

CSCI 689. Social Implications of Computers. 3 Credits.
Capstone course for Computer Science. Presentation and discussion of several ethical and social issues that have arisen from the introduction of the computer including copy-protected software and liability for computer software errors. {Also offered for undergraduate credit - see CSCI 489.}.

CSCI 690. Graduate Seminar. 1-3 Credits.

CSCI 695. Field Experience. 1-15 Credits.

CSCI 696. Special Topics. 1-5 Credits.

CSCI 702. Survey of Cybersecurity. 3 Credits.
This course provides students with an overview of the key concepts and areas of cybersecurity. It is designed to provide an accelerated overview of the field to graduate students to facilitate more in-depth instruction and research inquiry in specific areas, informed by knowledge of the whole field. Students will also learn how to utilize this broad knowledge to synthesize and evaluate network defense plans.

CSCI 706. Data-Driven Security. 3 Credits.
This course will cover the use of data science techniques such as data preparation, feature selection, exploratory data analysis, visualization and machine learning to efficiently manipulate, analyze and gain valuable insights from cyber security data.

CSCI 707. Usable Security and Privacy. 3 Credits.
Introduce human-centric methodology and principles/guidelines on secure interaction design. Cover evaluation methods in Human Computer Interaction to measure usability issues in security and privacy systems.

CSCI 712. Mobile Software Engineering. 3 Credits.
This course introduces recent advancements in mobile software engineering tools and techniques, in addition to the best practices for building high-quality, reliable, and secure mobile apps.

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. Computational Intelligence. 3 Credits.
This course acquaints students with computational intelligence techniques to provide them with working knowledge for applying these approaches. The course describes neural networks, evolutionary computation, swarm intelligence, fuzzy logic and reasoning, and expert systems and shows how these can be applied.

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 779. Advanced Machine Learning. 3 Credits.
Advanced level of modern machine learning technologies and methods, specifically deep neural networks and to apply these machine learning and data mining skills to various applications. Python and coding experience are required.

CSCI 783. Topics In Software Systems. 3 Credits.
Includes an area of computer science not otherwise treated in computer science courses. Varies each time offered. May be repeated.

CSCI 787. Topics in Operations Research. 3 Credits.
Includes an area of operational research not considered in other courses. Varies each time offered. May be repeated.

CSCI 790. Graduate Seminar. 1-3 Credits.

CSCI 791. Temporary/Trial Topics. 1-5 Credits.

CSCI 793. Individual Study/Tutorial. 1-5 Credits.

CSCI 795. Field Experience. 1-15 Credits.

CSCI 796. Special Topics. 1-5 Credits.

CSCI 797. Master's Paper. 1-3 Credits.

CSCI 798. Master's Thesis. 1-10 Credits.

CSCI 834. Knowledge Based Systems. 3 Credits.
Examination of types of knowledge-based systems, their powers and limitations. Students create their own knowledge-based system. Prereq: CSCI 724.

CSCI 835. Neural Networks. 3 Credits.
Introduction to the parallel processing paradigms that have been developed recently including neuronetworks and genetic algorithms. Students will work on projects using these tools. Prereq: CSCI 724. Cross-listed with PSYC 774 and IME 774.

CSCI 842. Algorithms and Complexity. 3 Credits.
Linear and nonlinear recurrences, algebraic problems, fast Fourier transforms, lower bound theory, computational geometry, the classes P and NP-completeness, Cook's theorem, NP-hard problems. Prereq: CSCI 741.

CSCI 845. Formal Methods for Software Development. 3 Credits.
The course is a high level course with the aim of formal representation to be able to formally assess characteristics of software. The formal representations are based on the theoretical foundations of computer sciences such as set theory, logic or graph theory. Prereq: CSCI 713.

CSCI 846. Development of Distributed Systems. 3 Credits.
This course is an advanced course in software engineering aiming at strategies and solutions of distributed systems. It assumes the knowledge of software engineering and particularly design and implementation of software systems, then builds on these concepts to how distributed systems are designed and implemented. Prereq: CSCI 713.

CSCI 847. Software Complexity Metrics. 3 Credits.
This course covers complexity metrics for the entire software lifecycle. Students gain experience in using requirements metrics, design metrics, program metrics, test metrics, and planning metrics. The effectiveness and limitations of metrics in all these areas are emphasized. Prereq: CSCI 718.

CSCI 848. Empirical Methods in Software Engineering. 3 Credits.
This course will cover the basics of Empirical Software Engineering. It will focus on the need for collecting metrics and building models as well as the concepts involved in design experiments. Prereq: CSCI 713.

CSCI 858. Bioinformatics Data Mining. 3 Credits.
Techniques and objectives of data mining for biological data with focus on diverse data sources including graphs, sequences and text. Preparation for research in bioinformatics with focus on functional genomics problems. Prereq: CSCI 732.

CSCI 859. Computational Methods in Bioinformatics. 3 Credits.
An introduction to computer science and operations research methods and algorithms that are used for analysis and solution of optimization and other models in bioinformatics.

CSCI 862. Network Flows. 3 Credits.
Theory and algorithms for network flow optimization including network representation data structures, basic change methods, maximum flow, shortest path, minimum cost problems, and generalized networks. Prereq: CSCI 653.

CSCI 866. Database System Internals. 3 Credits.
Transaction management, processing; correctness; recoverability; serializability (conflict and view); concurrency control (2PL, BTO, SGT, multiversion); recovery; distributed systems (correctness, recovery, replication); query processing and optimization. Prereq: CSCI 765.

CSCI 880. Methods of Optimization. 3 Credits.
Elements of convex analysis, constrained and unconstrained multi-dimensional linear and nonlinear optimization theory and algorithms, convergence properties and computational complexity. Prereq: CSCI 653. Cross-listed with MATH 880.

CSCI 885. Topics in Computer Architecture. 3 Credits.
Includes an area of computer architecture not considered in other courses. Varies each time offered. May be repeated.

CSCI 889. Topics in Theoretical Computer Science. 3 Credits.
Includes an area of theoretical computer science not considered in other courses. Varies each time offered. May be repeated.

CSCI 893. Individual Study/Tutorial. 1-5 Credits.

CSCI 895. Field Experience/Practicum. 1-15 Credits.

CSCI 899. Doctoral Dissertation. 1-15 Credits.

Construction Management & Engineering (CM&E)

CM&E 111. Introduction to Construction Management and Engineering. 1 Credit.
This course provides an introduction to the roles and duties of construction professionals and the various career opportunities available to construction graduates. 1 lecture. F.

CM&E 194. Individual Study. 1-3 Credits.

CM&E 196. Field Experience. 1-15 Credits.

CM&E 199. Special Topics. 1-5 Credits.

CM&E 200. Construction Documents and Codes. 3 Credits.
This course provides an introduction to construction working drawings; methods and materials of construction; and building codes. Prereq: Construction Management or Construction Engineering majors only.

CM&E 203. Building Construction: Methods and Materials. 3 Credits.
This course provides an introduction to the fundamentals of building construction, materials, and methods for residential and commercial construction. Prereq: CM&E 200 and students must be admitted to the Construction Management program and be at least sophomore standing.

CM&E 204. Construction Surveying. 3 Credits.
An introduction to basic surveying procedures and operations for construction site layout, alignment, and dimension control. Fieldwork topics include the operation of automatic levels, laser levels, transit theodolites, total stations, and GPS receivers. 2 one-hour lectures and 1 three-hour fieldwork. Prereq: MATH 105, Construction Management or Construction Engineering majors and at least sophomore standing.

CM&E 212. Construction Graphic Communications. 3 Credits.
This course provides an introduction to computer aided drafting (AutoCAD) for the creation of two-dimensional drawings related to the construction industry including a comprehensive final project layout using the techniques introduced in the course. Prereq: Construction Management or Construction Engineering major.

CM&E 240. Financial Cost Concepts for Construction Managers. 3 Credits.
This course provides an introduction to financial management and economic appraisal of construction projects. Topics include: accounting systems; financial documents; managing costs and cash flow; setting profit margins for bidding; time value of money; and economic evaluation of projects. Prereq: ECON 105 or ECON 201 or ECON 202 and Construction Management or Construction Engineering major with at least sophomore standing.

CM&E 250. Construction Statics and Mechanics. 3 Credits.
This course provides an introduction to the principles of statics and strength of materials with a focus on the behavior of structural components and systems in the construction industry. Prereq: MATH 146 or higher, Construction Management major and at least sophomore standing.

CM&E 260. Soils and Foundations. 3 Credits.
This course provides a discussion of the aspects of engineering & physical properties of soils; stress; settlement; consolidation; slope stability; earth pressure; bearing capacity; drainage; pore pressure; and foundations. 2 lectures, 1 three-hour laboratory. Prereq: Construction Management majors only.

CM&E 291. Seminar. 1-3 Credits.

CM&E 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CM&E 294. Individual Study. 1-3 Credits.

CM&E 299. Special Topics. 1-5 Credits.

CM&E 301. Construction Technology and Equipment. 3 Credits.
This course provides a discussion of construction techniques; analysis of equipment costs; production; methods of equipment selection; earthwork; dewatering systems; and aggregate production. Prereq: CM&E 240, admission to the Construction Management or Construction Engineering program and junior or senior standing. S.

CM&E 305. Pre-Construction Management. 3 Credits.
Looks into the construction management process, giving insight to how the construction professional interacts with other industry professionals. Overview of estimating, scheduling, and administrative functions of a project and the collaborative efforts required. Prereq: Admission to the Construction Management or Construction Engineering program and at least junior standing.

CM&E 315. Specifications and Contracts. 3 Credits.
This course provides a discussion of various types of construction contracts; contract administration; specifications using CSI and AIA documents. 3 lectures. Prereq: Admission to Construction Management or Construction Engineering program and Junior standing.

CM&E 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CM&E 380. Construction Estimating: Quantities and Costs. 3 Credits.
This course provides an introduction to the methods and techniques of conceptual and detailed construction estimating, including: quantity takeoffs; costs related to labor, materials, equipment, overhead and profit; and bidding strategies. Prereq: CM&E 200 and admission to the Construction Management or Construction Engineering program and at least junior standing.

CM&E 391. Seminar. 1-3 Credits.

CM&E 394. Individual Study. 1-3 Credits.

CM&E 397. Fe/Coop Ed/Internship. 1-4 Credits.

CM&E 399. Special Topics. 1-5 Credits.

CM&E 403. Scheduling and Project Control. 3 Credits.
This course provides a discussion on the theories, principles, and techniques of construction planning and scheduling with an emphasis on time management, costs, and resources through the preparation and analysis of network schedules. Co-req or Prereq: CM&E 380. Prereq: Admission to the Construction Management or Construction Engineering program and at least junior standing. {Also offered for graduate credit - see CM&E 603}.

CM&E 405. Construction Support Operations. 3 Credits.
This course provides an introduction to construction safety, construction quality control management, and labor productivity. Prereq: STAT 330. {Also offered for graduate credit - see CM&E 605.}.

CM&E 421. Electrical and Mechanical Construction. 3 Credits.
This course provides an introduction to electrical and mechanical systems, the design and construction procedures used, code-based requirements, interaction with general construction and structural components, and spatial requirements. Prereq: PHYS 211 or PHYS 251 or PHYS 252 and admission to the Construction Management program and at least senior standing.

CM&E 430. Land Development. 3 Credits.
This course provides an introduction to the practical applications of the planning, design, and construction phases of the land development process. Prereq: CM&E 204, CM&E 212 and admission to the Construction Management program and at least senior standing. F {Also offered for graduate credit - see CM&E 630.}.

CM&E 431. Sustainable Design and Construction. 3 Credits.
This course prepares students to become green building leaders and sustainability-focused citizens. This course involves the pre-selection and evaluation of a building to improve its sustainable performance through reviewing feasibility assessments, project management, implementation, audits, and documentation. Prereq: Admission to the Construction Management or Construction Engineering majors with at least junior standing.

CM&E 450. Steel Design and Construction. 3 Credits.
This course provides a discussion of the selection and design of structural steel systems and methods of construction assembly. 3 lectures. Prereq: CM&E 250 and admission to the Construction Management program and senior standing.

CM&E 453. Concrete Design and Construction. 3 Credits.
This course provides an introduction to the fundamental concepts of concrete construction from both design and construction perspectives. 2 one-hour lectures, 1 three-hour laboratory. Prereq: CM&E 250 and CM&E 260 and admission to the Construction Management program and senior standing.

CM&E 460. Infrastructure Management. 3 Credits.
This course provides an introduction to the methodologies, tools, and techniques of infrastructure management. Course topics focus on performance measures; deterioration modeling; life-cycle costs; optimization; budgeting; financial management; and policy analysis. Prereq: Junior standing. {Also offered for graduate credit - see CM&E 660.}.

CM&E 465. Bridge Engineering and Management. 3 Credits.
This course provides an introduction to the planning, design, construction, and management concepts of structural steel and reinforced concrete bridges, Including: application of AASHTO LRFD specifications and latest developments in bridge management systems. Prereq: Admission to the Construction Management or Construction Engineering program and senior standing. {Also offered for graduate credit - see CM&E 665.}.

CM&E 475. Design of Site Erosion Control. 3 Credits.
This course provides an introduction to construction site erosion mechanisms; site hydrology and sediment transport; the selection, design, and maintenance of erosion control devices; and erosion control standards and regulations. Prereq: CE 309.

CM&E 486. Building HVAC Design. 3 Credits.
This course discusses design of the hardware necessary to satisfy a building's heating/cooling loads and ventilation. The hardware includes piping, pumps, diffusers, fans, ducts, cooling towers, and refrigeration equipment. Prereq: ME 485 and senior standing in Construction Engineering major or admission to Mechanical Engineering major.

CM&E 487. Building Automation and Control Systems. 3 Credits.
This course is about automation and direct digital control for programmable control of commercial building HVAC systems, including control technology; measuring technology; actuators; control valves and dampers; control of HVAC plants; data communication. Prereq: CM&E 486 and ECE 301 and senior standing in Construction Engineering or Mechanical Engineering program. {Also offered for graduate credit - see CM&E 687.

CM&E 488. Construction Management Capstone. 3 Credits.
This course focuses on applying knowledge and skills learned in the previous courses, a look into construction management process, interactions, marketing, estimating, scheduling, and other functions for a management plan for a construction project. Prereq: CM&E 380, CM&E 403 and senior standing in Construction Management.

CM&E 489. Construction Design Capstone. 3 Credits.
This course focuses on the design and construction aspects of an actual construction project. Prereq: CM&E 380, CM&E 403 and senior standing in Construction Engineering.

CM&E 491. Seminar. 1-5 Credits.

CM&E 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CM&E 494. Individual Study. 1-5 Credits.

CM&E 496. Field Experience. 1-15 Credits.

CM&E 499. Special Topics. 1-5 Credits.

CM&E 603. Scheduling and Project Control. 3 Credits.
This course provides a discussion on the theories, principles, and techniques of construction planning and scheduling with an emphasis on time management, costs, and resources through the preparation and analysis of network schedules. F {Also offered for undergraduate credit - see CM&E 403.}.

CM&E 605. Construction Support Operations. 3 Credits.
This course provides an introduction to construction safety, construction quality control management, and labor productivity. {Also offered for undergraduate credit - see CM&E 405.}.

CM&E 630. Land Development. 3 Credits.
This course provides an introduction to the practical applications of the planning, design, and construction phases of the land development process. F {Also offered for undergraduate credit - see CM&E 430.}.

CM&E 660. Infrastructure Management. 3 Credits.
This course provides an introduction to the methodologies, tools, and techniques of infrastructure management. Course topics focus on performance measures; deterioration modeling; life-cycle costs; optimization; budgeting; financial management; and policy analysis. Prereq: Junior standing.{Also offered for undergraduate credit - see CM&E 460.}.

CM&E 665. Bridge Engineering and Management. 3 Credits.
This course provides an introduction to the planning, design, construction, and management concepts of structural steel and reinforced concrete bridges, Including: application of AASHTO LRFD specifications and latest developments in bridge management systems. Prereq: Senior standing. {Also offered for undergraduate credit - see CM&E 465.}.

CM&E 687. Building Automation and Control Systems. 3 Credits.
This course is about automation and direct digital control for programmable control of commercial building HVAC systems, including control technology; measuring technology; actuators; control valves and dampers; control of HVAC plants; data communication. {Also offered for undergraduate credit - see CM&E 487.}.

CM&E 696. Special Topics. 1-5 Credits.

CM&E 701. Construction Technology and Equipment. 3 Credits.
This course provides an overview of advanced construction technology and equipment. It covers site improvement, industrial plants, pavements, tunnels, buildings, construction innovation, sustainability, equipment selection and optimization, replacement analysis, and mathematical modeling in construction.

CM&E 703. Advanced Project Planning and Control. 3 Credits.
This course provides a discussion on advanced and emerging theories, principles, tools and techniques of planning, monitoring, and control problems and uncertainties arising in construction projects. Prereq: CM&E 603 or equivalent.

CM&E 711. Construction Cost Estimating. 3 Credits.
This course provides an advanced discussion of quantity takeoffs; labor, materials, equipment, and overhead costs; profit; and bidding strategies for construction projects.

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 cirtical management skills and the analysis of organizational management systems. Theories of motivation, planning, leadership, organizational interactions, etc. as they relate to construction operations.

CM&E 785. Advanced Project Engineering and Management. 3 Credits.
This course provides a discussion of advanced topics in construction project engineering and management. Topics include: Geographic Information Systems (GIS) applications in construction, front end planning, and forensic engineering.

CM&E 790. Graduate Seminar. 1-5 Credits.

CM&E 793. Individual Study/Tutorial. 1-5 Credits.

CM&E 795. Field Experience. 1-15 Credits.

CM&E 797. Master's Paper. 1-3 Credits.

CM&E 798. Master's Thesis. 1-10 Credits.

Counselor Education (CNED)

CNED 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CNED 710. Counseling Techniques. 3 Credits.
Basic principles and techniques in the counseling process. Emphasis given to counseling techniques from several counseling orientations.

CNED 711. Counseling Theory. 3 Credits.
Study of various theories and philosophies of counseling and therapy.

CNED 712. Counseling Across the Lifespan. 3 Credits.
Application of personality theory and the life stages to human behavior, family dynamics, and the counseling process.

CNED 713. Assessment Techniques. 3 Credits.
Techniques and procedures of studying the individual and diagnostic process in identifying client issues. Prereq: CNED 710 and CNED 711 or instructor approval.

CNED 714. Career Counseling and Testing. 3 Credits.
Study of theories of career development and the use of career information and testing in career counseling. Prereq: Admission to program or instructor approval.

CNED 715. Professional Orientation and Ethics. 3 Credits.
Introduction to dealing with professional and ethical responsibilities and multicultural issues in the counseling field. Prereq: Admission to CNED program.

CNED 716. Social and Cultural Foundtions of Counseling. 3 Credits.
Issues and trends in counseling with multicultural and diverse populations within our society. Prereq: CNED 710, CNED 711.

CNED 720. Group Counseling. 3 Credits.
Study of group counseling principles appropriate to various counseling settings including schools, treatment centers, and agencies. Includes a group experience. Prereq: Admission to Counselor Education program.

CNED 723. Psychopathology and Diagnosis for Counselors. 3 Credits.
Psychopathology, abnormal psychology and the diagnosis of mental and emotional disorders will be studied. The diagnostic process and nomenclature, treatment, referral and prevention of mental and emotional disorders across the lifespan will be examined. Prereq: Admission to program or instructor approval.

CNED 728. Guidance Administration and Consulting. 3 Credits.
Role of administrators, counseling personnel, and teachers in the management of and consulting in K-12 counseling programs. Prereq: Admission to program or instructor approval.

CNED 729. Professional K-12 School Counseling. 3 Credits.
Overview of principles and functions of a K-12 school counseling program, and examination of K-12 school counseling issues and resources. Prereq: CNED 728.

CNED 730. Crisis and Trauma in Counseling Practice. 3 Credits.
Students study various forms of trauma, personal violence, crisis, and disasters Appropriate counseling strategies and interventions are emphasized. Prereq: CNED 710, CNED 711.

CNED 731. Counseling Children and Adolescents. 3 Credits.
Counseling with children and adolescents including specific counseling strategies; mental, physical, and emotional development issues related to counseling. Prereq: CNED 710, CNED 711.

CNED 732. Family Counseling. 3 Credits.
Principles and techniques of family counseling, study of family dynamics, family systems, and theories of family counseling. Prereq: CNED 710, CNED 711.

CNED 734. Dynamics of Addiction. 3 Credits.
Study of the theories and scope of addiction from both the personal and social viewpoints with consideration given to the impact on the family. Prereq: CNED 710, CNED 711.

CNED 735. Clinical Mental Health Counseling. 3 Credits.
Professional knowledge, skills, and practices necessary to address a wide variety of circumstances within the clinical mental health counseling context including prevention and basic intervention skills and professional advocacy.

CNED 750. Research and Program Evaluation in Clinical Practice. 3 Credits.
This course introduces the purposes and practices of counseling research and program evaluation related to professional counseling practice. It focuses on the elements of doing research and program evaluation using the products of research to support and enhance counseling practice and programs. Students will be able to identify various research approaches, including the range of methodologies typically used in counseling research, and the strengths and limitations associated with them. This course also is designed to give students the necessary skills to conduct meaningful research, following the scientist-practitioner philosophy of professional counseling.

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 799. Master's Examination. 1-6 Credits.

CNED 863. Advanced Clinical Assessment, Report Writing, & Treatment Planning. 3 Credits.
Advanced assessment procedures and abnormal psychology in clinical mental health settings are examined. Emphasis is on administering and interpreting assessments and integrating results into individualized reports including diagnoses, interventions, and treatment with measurable counseling outcomes. Prereq: CNED 713 and admission to the CNED doctoral or master's program.

CNED 866. Leadership and Advocacy in Counselor Education and Supervision. 3 Credits.
A seminar that addresses leadership and advocacy in counselor education and supervision. Prereq: Admission to the Counselor Education and Supervision PhD Program or permission from instructor.

CNED 867. Advanced Group Counseling. 3 Credits.
Theory and practice of group facilitation will be covered, building on the student's current expertise. Supervised practice in group work is included. Prereq: Admission to doctoral program or permission from instructor.

CNED 869. Instructional Theory and Practice in Counselor Education and Supervision. 3 Credits.
This course addresses theories pertaining to the practices of teaching and learning within the context of professional counseling. Students explore instructional models, educational techniques, and facilitate supervised learning experiences for master's level classes. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 870. Counselor Supervision. 3 Credits.
Theory and practice of counselor supervision. Major schools of thought in counselor supervision will be examined, as well as the process of supervision and relationship between supervisor and supervisee. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 871. Advanced Multicultural Practice in Counselor Education and Supervision. 3 Credits.
This course is designed for students to engage in the advanced study and practice of counseling with diverse populations A major focus is advocacy for minority, non-dominant and oppressed populations. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 872. Advanced Counseling Theories. 3 Credits.
This course is designed for students to engage in the advanced study and practice of theory. Application of theory and models for case conceptualization and treatment of crisis and trauma are emphasized. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 876. Qualitative Research and Program Evaluation. 3 Credits.
Major approaches for qualitative research in counselor education are examined. Theory and practice issues are included, as well as processes for data analysis. Models and methods of program evaluation are included. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 879. Quantitative and Survey Research. 3 Credits.
In-depth analysis of theory, method and technique for conceptualizing and conducting quantitative research in counseling and counselor education will be examined. Survey design and methodology will be included. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 880. Ethical and Legal Issues in Counselor Education and Supervision. 3 Credits.
This course is designed for students to engage in the advanced study of ethical and legal issues in counseling and in the practice of counselor education and supervision. Equivalent to EDUC 757. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 887. Professional Issues: Professional Development, Consultation and Publishing. 3 Credits.
A seminar that addresses the following: needs of practitioners for professional development, both as consumers and providers; theory and practice of consultation; and, the process of developing, writing and submitting manuscripts for publication. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 890. Graduate Seminar. 1-5 Credits.

CNED 893. Individual Study/Tutorial. 1-5 Credits.

CNED 894. Practicum/Internship. 1-8 Credits.

CNED 899. Doctoral Dissertation. 1-15 Credits.

Criminal Justice (CJ)

CJ 201. Introduction to Criminal Justice. 3 Credits.
Examination of the criminal justice system and process. Includes crime, lawmaking, criminality, prosecution, police, courts, and corrections.

CJ 210. Introduction to Policing. 3 Credits.
This course provides an overview of the purpose and function of the police in the United States.

CJ 226. Criminal Investigation. 3 Credits.
Exploration of criminal investigation principles, procedures, and techniques, including inferential reasoning, securing and preserving of evidence, surveillance, interviews and interrogations, report writing, and courtroom testimony. Prereq: Criminal Justice majors or minors only.

CJ 230. Criminology. 3 Credits.
Study of criminal behavior and the measurement of crime and victimization. Major theories of crime causation and specific types of crime will be examined.

CJ 260. Introduction to Forensic Science. 3 Credits.
Purposes and techniques of forensic examination of criminal evidence. Introduction to the application of scientific knowledge to crime scenes and evidence.

CJ 270. Introduction to Corrections. 3 Credits.
This course provides an overview of the correctional system, including prisons and community sanctions, in the United States.

CJ 291. Seminar. 1-5 Credits.

CJ 299. Special Topics. 1-5 Credits.

CJ 310. Women and Policing. 3 Credits.
This course provides an overview of women working as police officers in the United States. The course will provide the history, changing role, integration, and future of female police officers into this male dominated profession.

CJ 315. Federal Law Enforcement and Crime Policy. 3 Credits.
Examination of the history, development, current make-up, and jurisdiction of federal law enforcement in the United States, as well as the role of the federal government in setting national crime policy and the strategies employed. Cross-listed with POLS.

CJ 325. Applied Research Methods. 3 Credits.
This course provides an overview of the scientific model, the philosophy and goals of science, and a detailed study of qualitative and quantitative methodologies. Prereqs: CJ 201, CJ 210, CJ 230, and CJ 270.

CJ 330. Criminal Law and Procedure. 3 Credits.
Examination of criminal law and procedure, including the elements of criminal offenses, search and seizure laws, rights of defendants and victims, and due process in criminal law. The criminal laws of North Dakota and Minnesota will be emphasized and explored. Prereq: admission to the Criminal Justice major or minor or declared Fraud Investigation minor.

CJ 350. Serial Killers and Serial Killings. 3 Credits.
An overview of the history and typologies associated with serial killers in the United States. Examines theoretical explanations for this behavior, as well as investigation and profiling techniques used to identify people involved in this crime.

CJ 354. Media, Crime and Justice in America. 3 Credits.
An overview of how mass media presents crime, criminals, and the American criminal justice system. Examines current research using a social constructionist theoretical perspective to better understand the implications of the media's presentation of crime in America.

CJ 370. True Crime. 3 Credits.
Exploration of the history and societal causes and effects of the True Crime genre. Examination of historical and contemporary true crime cases with criminological theory, and critique of criminal justice system, laws, and policies.

CJ 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CJ 391. Seminar. 1-5 Credits.

CJ 394. Individual Study. 1-5 Credits.

CJ 399. Special Topics. 1-5 Credits.

CJ 406. Crime and Delinquency. 3 Credits.
Study of the nature and extent of juvenile delinquency. Analysis of causes of juvenile offending and an exploration of policies to combat delinquency. Prereq or Co-req: CJ 325. {Also offered for graduate credit - see CJ 606.}.

CJ 407. Deviant Behavior. 3 Credits.
Analysis of the precursors, the processes, and the consequences of deviance in Western society. Prereq: SOC 110 or PSYC 111. Cross-listed with SOC 407. {Also offered for graduate credit - see CJ 607.}.

CJ 410. Police & Society. 3 Credits.
This course offers a theoretically-grounded and advanced examination of the role of police in society, with a focus on police effectiveness and accountability. Prereq or co-req: CJ 325.

CJ 430. Issues in Forensic Science. 3 Credits.
Exploration and analysis of the practical, legal, and ethical issues of the use of forensic evidence in the justice system. Prereq: CJ 260.

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. {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. {Also offered for graduate credit - see CJ 661.}.

CJ 465. Gender, Race and Ethnicity in Criminal Justice. 3 Credits.
Analysis of roles and contributions of women and people of color in the criminal justice system as offenders, victims and practitioners. Examines effect of court decisions, rule-making and contemporary criminal justice practices on women and people of color. Prereq: CJ 325. {Also offered for graduate credit - See CJ 665.}.

CJ 489. Senior Capstone in Criminal Justice. 1 Credit.
Synthesis of criminal justice research, methods, and criminological theory. Prereq: Senior standing.

CJ 494. Individual Study. 1-5 Credits.

CJ 496. Field Experience. 1-15 Credits.

CJ 499. Special Topics. 1-5 Credits.

CJ 606. Crime and Delinquency. 3 Credits.
Study of the nature and extent of juvenile delinquency. Analysis of causes of juvenile offending and an exploration of policies to combat delinquency. {Also offered for undergraduate credit - see CJ 406.}.

CJ 607. Deviant Behavior. 3 Credits.
Analysis of the precursors, the processes, and the consequences of deviance in Western society. Cross-listed with SOC 607. {Also offered for undergraduate credit - see CJ 407.}.

CJ 660. Criminal Court System. 3 Credits.
Analysis of the structure and function of the criminal court system in the United States, including the prosecutor, defense counsel, judge, and jury. Issues confronting the system are considered from historical, philosophical, and sociological perspectives. {Also offered for undergraduate credit - see CJ 460.}.

CJ 661. Corrections. 3 Credits.
Analysis of institutional and community-centered corrections. Emphasis on historical, contemporary, and developing trends regarding structures, program content, and problems. {Also offered for undergraduate credit - see CJ 461.}.

CJ 665. Gender, Race and Ethnicity in Criminal Justice. 3 Credits.
Analysis of roles and contributions of women and people of color in the criminal justice system as offenders, victims and practitioners. Examines effect of court decisions, rule-making and contemporary criminal justice practices on women and people of color. Restricted to accelerated master's students only {Also offered for undergraduate credit - See CJ 465.}.

CJ 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CJ 696. Special Topics. 1-5 Credits.

CJ 702. Program Evaluation. 3 Credits.
Examination of the development and implementation of criminal justice program/policy evaluation, including the techniques of applied research and practical considerations. Topics also include ethical issues, evaluation planning, process, impact and cost-benefits analyses, grant writing, and dissemination of findings. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 703. Advanced Criminology. 3 Credits.
Advanced study of the distribution of crime and the major theories of crime causation from an interdisciplinary perspective, including special attention to issues relating to the measurement, nature, and extent of crime in the US. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 707. Juvenile Corrections. 3 Credits.
Examination of the history of ideas about and responses to juvenile delinquency, the scope and nature historically and today, and the responses by various parts of the juvenile justice system, as well as responses by other social institutions such as the family, community and schools. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 709. Criminal Justice Policy. 3 Credits.
Examination of concepts related to the development, implementation, and evaluation of public policy as it relates to the criminal justice system, including the history, development and operation of policing, courts/sentencing, corrections, crime prevention, offender rehabilitation, and issues related to drugs and crime and race and crime. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 721. Individual Theories of Crime. 3 Credits.
Review of historical and contemporary individual theories of crime. Discussion of the assumptions, causes, and policy implications of criminological theories. Prereq: CJ 703. Graduate standing in Criminal Justice or instructor approval.

CJ 722. Structural Theories of Crime. 3 Credits.
Review of historical and contemporary structural theories of crime, including criteria of good theory, the assumptions of various criminological theories, and the similarities and differences in theories. Prereq: CJ 703. Graduate standing in Criminal Justice or instructor approval.

CJ 732. Applied Interpretation of Criminal Justice Methods. 3 Credits.
This class is intended to provide an advanced interpretation of criminal justice methodologies. This course examines how criminal justice research employs various methodologies to study how/when/why people commit or recommit crime. Using research in the fields of criminal justice and criminology, the class will focus on interpreting the methodologies that examine continuous, dichotomous, categorical, and count endogenous variables under normal and skewed distribution assumptions. Prereq: STAT 725. Restrictions: Enrolled in Masters or Ph.D. Criminal Justice Program.

CJ 733. Issues in Institutional Corrections. 3 Credits.
Course examining the various issues in adult prisons and jails in the United States. Topics include male and female inmates' life in prison, violence, prisoners' rights, management and staff issues, and differences between prisons and jails.

CJ 734. Advanced Criminal Justice Methods. 3 Credits.
Provides an examination of the research process. Explores how criminologists conduct research, pitfalls of research and importance of discovery and application. Prereq: Undergraduate methods course in the social or behavioral sciences and a statistics course.

CJ 750. Violence. 3 Credits.
Examination of various aspects of criminal violence, including various social settings (e.g., community, domestic, and school) with attention to the causes, consequences, moderating factors and proposed solutions associated with violent criminal behavior. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 752. Crime and the Life Course. 3 Credits.
The life course will be examined as a theoretical orientation, a research methodology, and as an empirical field of study with special reference to crime and deviance. Key conceptual and research issues will be analyzed and discussed.

CJ 754. Police and Society. 3 Credits.
This course provides graduate students with an overview of US law enforcement. Topics covered include officer use of discretion, officer behavior, organizational function, and delivery of police services and will be examined from an advanced research orientation.

CJ 755. Criminal Justice Leadership and Administration. 3 Credits.
Organizational theory, leadership, communication, labor relations, and crisis management in criminal justice 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 766. Managing Liability and Risk in Criminal Justice. 3 Credits.
Identify principles of risk management, as well as risks associated with liability and litigation within police and correctional agencies. Examine strategies to prevent negative outcomes associated with hiring practices, policies, training, and supervision.

CJ 767. Reform and Accountability in Criminal Justice and Crime Policies. 3 Credits.
Examine historical and contemporary reform efforts associated with the criminal justice system and crime policies in the United States. Identify strategies meant to increase accountability within police agencies, courts, and correctional facilities, while enhancing public safety.

CJ 768. Gender and Justice. 3 Credits.
Examination of the role of gender in crime and the criminal justice system, including the changing roles of men and women in society, differential involvement in criminal behavior, and differential criminal justice response. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 793. Individual Study. 1-5 Credits.

CJ 794. Practicum/Internship. 1-8 Credits.

CJ 795. Field Experience. 1-15 Credits.

CJ 796. Special Topics. 1-5 Credits.

CJ 797. Master's Paper. 1-3 Credits.

CJ 798. Master's Thesis. 1-10 Credits.

CJ 893. Individual Study. 1-5 Credits.

CJ 899. Doctoral Dissertation. 1-15 Credits.

Disaster Resilience and Emergency Management (DREM)

DREM 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.

DREM 150. Dealing with Terrorism, Cybersecurity and Other Emerging Threats. 3 Credits.
Examines the historical emergence of security threats and how American society has addressed them. Topics include key homeland security concerns and approaches, events, policies, and organizational structures including relationships to emergency management.

DREM 220. Technology, Tools, and Assessments in Disaster. 3 Credits.
Examines the use of technologies in emergency management and how technologies are used as tools to improve assessments and effectively implement emergency management activities across phases. Coreq: DREM 101.

DREM 222. Career and Professional Development. 3 Credits.
This course focuses on the elements of career and professional development important to personal and professional success. This includes: understanding strengths, interests, and career interests; soft skills important to success in the workplace and career field; examining career pathways; acquiring resume, interview, and job search ability; the role of professional development across the career pathway; and the importance of mentoring, leadership, and being a change agent.

DREM 299. Special Topics. 1-5 Credits.

DREM 325. World Disasters. 3 Credits.
Explores hazard events, emergency management processes and structures, and how they vary around the world.

DREM 345. Understanding Vulnerable Populations in Disasters. 3 Credits.
Using the framework of vulnerability theory this course examines research related to groups that have been historically labeled "special populations" and how their functional needs might be addressed through emergency management. The purpose of this course is to familiarize students with the concept of vulnerable populations and its relationship to disasters, the ways members of various populations can be impacted disproportionately by these events and needs that arise as a result, and what can or should be doing to help prepare for and respond to these needs.

DREM 361. Disaster Preparedness. 3 Credits.
Nature and rationale for public awareness of potential hazards that communities face, preparedness for these hazards, and potential strategies to mitigate adverse consequences. Prereq: DREM 101.

DREM 362. Disaster Mitigation. 3 Credits.
Role of emergency management programs in community resilience and sustainability; incorporation of preparedness, mitigation, response, and recovery in community comprehensive and strategic planning. Prereq: DREM 101.

DREM 363. Disaster Response. 3 Credits.
Principles and procedures related to emergency operations plans, warning, evacuation, search and rescue, mass casualty care, sheltering, donations, management, disaster declaration, and incident debriefing. Prereq: DREM 101.

DREM 364. Disaster Recovery. 3 Credits.
Examination of post-disaster policies and programs that protect the natural environment, improve disaster resistance, support diverse populations, improve economic conditions, and preserve community resources. Prereq: DREM 101.

DREM 381. Disasters Through A Systems Lens. 3 Credits.
Examination of natural and human-made disasters from a multidisciplinary perspective. Prereq: DREM 101.

DREM 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: DREM 101 and any one of the following: DREM 361, DREM 362, DREM 363 or DREM 364. Dual-listing: DREM 610.

DREM 413. Disaster Mitigation. 3 Credits.
Examination of how individuals and households, organizations, and communities can minimize their vulnerability to disaster and otherwise reduce or eliminate disaster impacts. Prereq: DREM 101. Dual-listing: DREM 613.

DREM 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.

DREM 431. Disaster Response. 3 Credits.
Examination of the immediate actions individuals and households, organizations, and government can take to preserve life, property, and the environment before, during, and after disasters. Prereq: DREM 101. Dual-listing: DREM 631.

DREM 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.

DREM 451. Disaster Preparedness. 3 Credits.
Examination of how individuals and households, organizations, and communities can work towards a state of readiness to respond and recover well if a disaster were to occur. Prereq: DREM 101. Dual-listing: DREM 651.

DREM 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. Dual-listing: DREM 661.

DREM 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: DREM 101. Dual-listing: DREM 663.

DREM 483. Disaster Recovery. 3 Credits.
Examines the processes that individuals, organizations, and communities must navigate to restore, rebuild, and reshape what had been impacted by a disaster. Prereq: DREM 101. Dual-listing: DREM 683.

DREM 491. Seminar. 1-5 Credits.

DREM 496. Field Experience. 1-15 Credits.

DREM 499. Special Topics. 1-5 Credits.

DREM 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. Dual-listing: DREM 410.

DREM 613. Disaster Mitigation. 3 Credits.
Examination of how individuals and households, organizations, and communities can minimize their vulnerability to disaster and otherwise reduce or eliminate disaster impacts. Dual-listing: DREM 613.

DREM 631. Disaster Response. 3 Credits.
Examination of the immediate actions individuals and households, organizations, and government can take to preserve life, property, and the environment before, during, and after disasters. Dual-listing: DREM 431.

DREM 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.

DREM 651. Disaster Preparedness. 3 Credits.
Examination of how individuals and households, organizations, and communities can work towards a state of readiness to respond and recover well if a disaster were to occur. Dual-listing: DREM 451.

DREM 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. Dual-listing: DREM 461.

DREM 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. Dual-listing: DREM 463.

DREM 683. Disaster Recovery. 3 Credits.
Examines the processes that individuals, organizations, and communities must navigate to restore, rebuild, and reshape what had been impacted by a disaster. Dual-listing: DREM 483.

DREM 690. Graduate Seminar. 1-5 Credits.

DREM 720. Resilience for Designers, Planners, and Managers. 3 Credits.
An analysis of the concept of resilience and how it might be applied in communities through the efforts of design, planning, and management professionals.

DREM 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 and SOC 701.

DREM 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.

DREM 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: DREM 613.

DREM 763. Response Theory and Practice. 3 Credits.
Examination of the theory and practice of response including response variance and effectiveness.

DREM 764. Recovery Theory and Practice. 3 Credits.
Theory, principles, and procedures used in disaster damage assessment and in emergency supply and service dissemination.

DREM 781. Disaster Analysis. 3 Credits.
Examination of natural and human-made disasters from a multidisciplinary perspective.

DREM 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: DREM 761.

DREM 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: DREM 762.

DREM 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: DREM 763.

DREM 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: DREM 764.

DREM 899. Doctoral Dissertation. 1-15 Credits.

Economics (ECON)

ECON 105. Elements of Economics. 3 Credits.
Study of demand and supply, competitive and noncompetitive markets, concepts of national income, unemployment, inflation, money, and fiscal and monetary policies. This course cannot be substituted for ECON 201 and ECON 202.

ECON 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

ECON 194. Individual Study. 1-3 Credits.

ECON 196. Field Experience. 1-15 Credits.

ECON 199. Special Topics. 1-5 Credits.

ECON 201. Principles of Microeconomics. 3 Credits.
Nature, method, and scope of economic analysis; economic scarcity, resources, specialization of labor; supply-demand analysis; production and cost analysis; product and resource market structures; distribution of income; international trade.

ECON 202. Principles of Macroeconomics. 3 Credits.
Aggregate income and employment analysis; business cycles, unemployment, inflation and economic growth; fiscal policy; money and monetary policy; the U.S. economy and the world economy.

ECON 205. Market Values. 3 Credits.
Fundamental to both business and economics is the creation of value in the marketplace. This course examines competing economic systems (capitalist vs socialist) and their ability to create value for society. The course engages modern texts in addition to classical texts from Adam Smith and Karl Marx. The role of entrepreneurs and business persons in contributing to a flourishing society will be emphasized. In addition to in class discussions, lectures and activities, you will be expected to participate in several experiences outside of the classroom.

ECON 211. Introduction to Computational Economics. 3 Credits.
Data visualization and basic concepts of statistics and economics taught through the analysis of economic data using computer spreadsheets. Prereq: One of the following: ECON 105, or ECON 201, or ECON 202.

ECON 291. Seminar. 1-3 Credits.

ECON 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ECON 294. Individual Study. 1-5 Credits.

ECON 299. Special Topics. 1-5 Credits.

ECON 324. Money and Banking. 3 Credits.
Institutional and theoretical framework of the financial structure including the banking system, Federal Reserve, money markets, and international monetary systems. Prereq: ECON 201, ECON 202.

ECON 341. Intermediate Microeconomics. 3 Credits.
Analysis of markets in terms of efficiency, resource use, and economic welfare. Prereq: ECON 201, MATH 144 (or MATH 165).

ECON 343. Intermediate Macroeconomics. 3 Credits.
Analysis of national output, business cycles, inflation, unemployment rates, interest rates, exchange rates, impact of monetary and fiscal policies, and economic growth. Prereq: ECON 201, ECON 202.

ECON 356. History of Economic Thought. 3 Credits.
Development of economic thought from philosophical foundations to the Neoclassical School. S Prereq: ECON 201, ECON 202, ENGL 120.

ECON 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ECON 391. Seminar. 1-3 Credits.

ECON 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ECON 394. Individual Study. 1-3 Credits.

ECON 397. Cooperative Education. 1-4 Credits.

ECON 399. Special Topics. 1-5 Credits.

ECON 402. Economics of Entrepreneurship. 3 Credits.
Study of the economic functions of entrepreneurs, how entrepreneurs increase market efficiency through bearing risk in ownership of resources, and how incentives affect and are affected by entrepreneurship and private enterprises operating in economic and political systems. Prereq: ECON 201 and ECON 202. {Also available for graduate credit - see ECON 602.}.

ECON 410. Econometrics. 3 Credits.
Introduction to estimation, hypothesis-testing techniques and econometric applications in economics, with emphasis on ordinary least squares regression analysis. Use of econometric software reinforces econometric theory and methods through applications to economic data. Prereq: ECON 341, STAT 330. {Also offered for graduate credit - see ECON 610.}.

ECON 411. Computational Economics. 3 Credits.
Economic computation for modeling, analysis, and data management, including an introduction of rudimentary elements of programming required for economic computation. Prereq: ECON 201 or ECON 202 and STAT 330 or STAT 367. {Also offered for graduate credit - see ECON 611.}.

ECON 439. Mathematical Economics. 3 Credits.
Master and advanced undergraduate level course in mathematical economics. Topics may include: linear models and matrix algebra, comparative statics, optimization, difference equations and differential equations. This course is designed to prepare students in the Agribusiness & Applied Economics MS and the International Agribusiness MS programs, along with Seniors in the Agribusiness, Agricultural Economics, and Economics BS programs for PhD-level economics courses. Prereq: ECON 341. {Also offered for graduate credit - see ECON 639.}.

ECON 440. Game Theory and Strategy. 3 Credits.
This course is an introduction to the economic theory of games: a set of tools used to analyze the interactions among strategic decision-makers. Recommended Prereq: ECON 341 or BUSN 487. Prereq: ECON 201, MATH 144 (or MATH 165), and STAT 330 (or STAT 367). {Also offered for graduate credit - see ECON 640.}.

ECON 461. Economic Development. 3 Credits.
Analysis of the main causes of economic development. Prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 661.}.

ECON 465. Labor Economics. 3 Credits.
Theoretical analysis and survey of empirical studies relating to labor markets, human capital formation, and nature and causes of unemployment. Prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 665.}.

ECON 470. Public Economics. 3 Credits.
The economics of the public sector, including: taxation, expenditure, public goods, externalities, and program evaluation. The course will be taught from both a traditional perspective and through the lens of political economics. Prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 670.}.

ECON 472. International Trade. 3 Credits.
Theories of international trade, payments, and foreign exchange markets. Prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 672.}.

ECON 475. Health Economics. 3 Credits.
Introduction to the application of economics to healthcare and medical care issues including demand and supply of healthcare, health insurance, health quality and safety, and the role of regulations within a healthcare system. Prereq: ECON 341. {Also offered for graduate credit - See ECON 675.}.

ECON 476. Monetary Theory and Policy. 3 Credits.
Analysis of relationships among money, credit, employment, price stability, and national monetary policy. Prereq: ECON 324 or ECON 343. {Also offered for graduate credit - see ECON 676.}.

ECON 480. Industrial Organization. 3 Credits.
Structural analysis of American industry in terms of the markets for business enterprise. Analysis of antitrust policy and its application to large corporations. Prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 680.}.

ECON 481. Natural Resource Economics. 3 Credits.
Application of economic tools to evaluate natural resource policies. Concepts such as property rights, non-market goods, resource allocation over time, externalities, open access, and public goods are discussed in an intermediate micro-economics and calculus-based format. Prereq: ECON 201.

ECON 482. Environmental Economics. 3 Credits.
Application of economic tools to evaluate environmental policies. Topics include cost benefit analysis, regulatory versus market pollution control approaches, environmental damage assessment, and green accounting. Prereq: ECON 341 or ECON 481 or BUSN 487. {Also offered for graduate credit - see ECON 682.}.

ECON 491. Seminar. 1-5 Credits.

ECON 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ECON 494. Individual Study. 1-5 Credits.

ECON 496. Field Experience. 1-15 Credits.
Field-oriented supervised learning activities outside the college classroom that include a preplanned assessment of the experience, registration during the term the experience is conducted, and post evaluation with the instructor. Departmental approval.

ECON 499. Special Topics. 1-5 Credits.

ECON 602. Economics of Entrepreneurship. 3 Credits.
Study of the economic functions of entrepreneurs, how entrepreneurs increase market efficiency through bearing risk in ownership of resources, and how incentives affect and are affected by entrepreneurship and private enterprises operating in economic and political systems. {Also available for undergraduate credit - see ECON 402.}.

ECON 610. Econometrics. 3 Credits.
Introduction to estimation, hypothesis-testing techniques and econometric applications in economics, with emphasis on ordinary least squares regression analysis. Use of econometric software reinforces econometric theory and methods through applications to economic data. {Also offered for undergraduate credit - see ECON 410.}.

ECON 611. Computational Economics. 3 Credits.
Economic computation for modeling, analysis, and data management, including an introduction of rudimentary elements of programming required for economic computation. {Also offered for undergraduate credit - see ECON 411.}.

ECON 639. Mathematical Economics. 3 Credits.
Master and advanced undergraduate level course in mathematical economics. Topics may include: linear models and matrix algebra, comparative statics, optimization, difference equations and differential equations. This course is designed to prepare students in the Agribusiness & Applied Economics MS and the International Agribusiness MS programs, along with Seniors in the Agribusiness, Agricultural Economics, and Economics BS programs for PhD-level economics courses. Prereq: Admission to the MS program in Agribusiness & Applied Economics, the MS program in International Agribusiness, or the PhD program in Applied Economics or permission by instructor. {Also offered for undergraduate credit - see ECON 439.}.

ECON 640. Game Theory and Strategy. 3 Credits.
This course is an introduction to the economic theory of games: a set of tools used to analyze the interactions among strategic decision-makers. {Also offered for undergraduate credit - see ECON 440.}.

ECON 661. Economic Development. 3 Credits.
Analysis of the main causes of economic development. {Also offered for undergraduate credit - see ECON 461.}.

ECON 665. Labor Economics. 3 Credits.
Theoretical analysis and survey of empirical studies relating to labor markets, human capital formation, and nature and causes of unemployment. {Also offered for undergraduate credit - see ECON 465.}.

ECON 670. Public Economics. 3 Credits.
The economics of the public sector, including: taxation, expenditure, public goods, externalities, and program evaluation. The course will be taught from both a traditional perspective and through the lens of political economics. {Also offered for undergraduate credit - see ECON 470.}.

ECON 672. International Trade. 3 Credits.
Theories of international trade, payments, and foreign exchange markets. {Also offered for undergraduate credit - see ECON 472.}.

ECON 675. Health Economics. 3 Credits.
Introduction to the application of economics to healthcare and medical care issues including demand and supply of healthcare, health insurance, health quality and safety, and the role of regulations within a healthcare system. {Also offered for undergraduate credit - See ECON 475.}.

ECON 676. Monetary Theory and Policy. 3 Credits.
Analysis of relationships among money, credit, employment, price stability, and national monetary policy. {Also offered for undergraduate credit - see ECON 476.}.

ECON 680. Industrial Organization. 3 Credits.
Structural analysis of American industry in terms of the markets for business enterprise. Analysis of antitrust policy and its application to large corporations. {Also offered for undergraduate credit - see ECON 480.}.

ECON 681. Natural Resource Economics. 3 Credits.
Application of economic tools to evaluate natural resource policies. Concepts such as property rights, non-market goods, resource allocation over time, externalities, open access, and public goods are discussed in an intermediate micro-economics and calculus-based format.

ECON 682. Environmental Economics. 3 Credits.
Application of economic tools to evaluate environmental policies. Topics include cost benefit analysis, regulatory versus market pollution control approaches, environmental damage assessment, and green accounting. {Also offered for undergraduate credit - see ECON 482.}.

ECON 696. Special Topics. 1-5 Credits.

ECON 701. Research Methods. 3 Credits.
Developing the skills necessary to formulate and conduct economics research. Topics include: conducting literature review and identifying gaps in the literature, formulating research questions and hypotheses, testing hypotheses, addressing causal identification issues, gathering and managing economic data, analyzing economic data, and effectively communicating research findings in both written and oral formats. 3 lectures. Cross-listed with AGEC 701.

ECON 710. Advanced Econometrics. 3 Credits.
Advanced econometric methods applied to time series and panel data analysis, limited dependent variable models, maximum likelihood estimation, systems estimation, and discrete choice models. Prereq: ECON 610.

ECON 762. New Institutional Economics. 3 Credits.
This course introduces theoretical and applied studies examining the role of formal and informal institutions that make economic interaction possible. Topics include property rights, contracts, transaction costs, informal norms, culture, and conventions.

ECON 791. Temporary/Trial Topics. 1-5 Credits.

ECON 793. Individual Study/Tutorial. 1-5 Credits.

ECON 810. Econometrics I. 3 Credits.
First course in Ph.D. core econometrics sequence. The focus of the course is foundational econometric theory as necessary for applied econometric analysis. Topics covered may include: matrix algebra approach to regression, inference, nonlinear regression, limited dependent variables, systems of equations, panel models, and time series models. Prereqs: ECON 639 and ECON 710.

ECON 811. Econometrics II. 3 Credits.
Second course in Ph.D. core econometrics sequence. The focus of the course is implementation of applied econometric analysis based on foundational econometric theory. Topics covered may include: methods of program evaluation, panel data methods, time series methods, machine learning methods. Prereq: ECON 810.

ECON 841. Microeconomic Theory I. 3 Credits.
First course in the PhD core microeconomics sequence. Topics include: consumption, production, demand, choice under uncertainty, general equilibrium, and welfare economics. Prereq: ECON 439 or ECON 639.

ECON 842. Microeconomic Theory II. 3 Credits.
Second course in the PhD core microeconomics sequence. Topics include: general equilibrium, game theory, information economics, and applications of game theory. Prereq: ECON 841 and ECON 439 or ECON 639.

Education (EDUC)

EDUC 120. Peer Counseling. 1 Credit.
Designed to bring peer counseling theory and practice together in helping freshmen overcome the hurdles of the first year. May be repeated.

EDUC 121. Approaches to Critical Reading. 1 Credit.
A developmental reading program designed to help the student improve in reading efficiency.

EDUC 123. Study Skills. 1 Credit.
Assistance in the development of study skills necessary for academic achievement through learning and practice.

EDUC 194. Individual Study. 1-5 Credits.

EDUC 196. Field Experience. 1-15 Credits.

EDUC 199. Special Topics. 1-5 Credits.

EDUC 291. Seminar. 1-3 Credits.

EDUC 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

EDUC 294. Individual Study. 1-5 Credits.

EDUC 299. Special Topics. 1-5 Credits.

EDUC 300. Orientation to Elementary Teaching. 2 Credits.
Overview of elementary education with special emphasis on the role of music and physical education. Required for K-12 certification in music and physical education.

EDUC 321. Introduction to Teaching. 3 Credits.
Nature and aims of education at middle and high school levels; social, philosophical, historical, curricular, and political foundations in a changing multicultural society; analyze teaching as a career choice, initiate teacher education program exit portfolio.

EDUC 322. Educational Psychology. 3 Credits.
Strong emphasis on educational research; review of human development; emphasis on developmental domains and span of students from young child through high school learning theories, learning styles, and individual student differences including gender, exceptionalities, culture.

EDUC 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

EDUC 391. Seminar. 1-3 Credits.

EDUC 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

EDUC 394. Individual Study. 1-5 Credits.

EDUC 399. Special Topics. 1-5 Credits.

EDUC 416. Teacher Education in International Comparative Perspective. 2 Credits.
Exploring teacher education in international contexts by comparing approaches to program development, examining curriculum characteristics, analyzing policies and investigating practices of teaching and learning in different countries. {Also available for graduate credit - see EDUC 616}.

EDUC 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 455. Socio-Psycho-Linguistics for Teachers of English Language Learners. 3 Credits.
This course will explore how language shapes culture and vice versa, considering how assumptions, prejudices and biases toward varying language affect the classroom and ELLs. Prereq: EDUC 454. {Also offered for graduate credit - see EDUC 655.}.

EDUC 461. Introduction to Special Education. 3 Credits.
Develops skills and knowledge for recognizing and effectively teaching students with various disabilities in the K-12 setting. Examines relevant laws, educational service delivery models, curricular planning approaches, and instructional adaptations. Ten hours of field experience is required. Prereq: EDUC 321 and admission into the School of Education. {Also offered for graduate credit - See EDUC 661.}.

EDUC 463. Inclusive Instructional Planning Across the K-12 Setting. 3 Credits.
Curriculum development aligned with general education content for students with disabilities. Identifying appropriate IEP goals, supplementary aids and services, and service coordination in K-12 inclusive school contexts will be emphasized. Ten hours of field experience is required. Prereq: EDUC 321 and admission into the School of Education. {Also offered for graduate credit - See EDUC 663.}.

EDUC 475. Reading in the Content Area. 2 Credits.
Introduction to the relevance and need for incorporating reading and developing reading skills in middle and high school classrooms.

EDUC 481. Classroom Practice Methods of Teaching I:. 2-3 Credits.
Specialized methods and classroom practices appropriate to the specific subject area. May be repeated. Prereq: EDUC 321, EDUC 322, admission to School of Education.

EDUC 482. Classroom Practice/Methods of Teaching II:. 2-3 Credits.
Specialized methods and classroom practices appropriate to the specific subject area. May be repeated. Prereq: EDUC 321, EDUC 322, admission to School of Education, EDUC 481. {Also offered for graduate credit - see EDUC 682.}.

EDUC 483. Classroom Practice/Methods of Teaching III:. 2 Credits.
Specialized methods and classroom practices appropriate to the specific subject area. May be repeated. Prereq: EDUC 321, EDUC 322, admission to School of Education, EDUC 481, EDUC 482. {Also available for graduate credit - see EDUC 683P.}.

EDUC 485. Student Teaching Seminar. 1 Credit.
Orientation to student teaching. Analysis of professional issues and concerns associated with education. Prereq: EDUC 389, EDUC 451, EDUC 483, EDUC 486. Coreq: EDUC 487. {Also offered for graduate credit - see EDUC 685P.}.

EDUC 486. Classroom Management for Diverse Learners. 3 Credits.
Teacher candidates develop a plan to establish an effective management system encompassing the total classroom environment. Prereq: EDUC 321, EDUC 322, admission to School of Education. {Also offered for graduate credit - see EDUC 686.}.

EDUC 487. Student Teaching. 9 Credits.
Supervised teaching in an approved and accredited school. Includes an on-campus seminar. May be repeated. Prereq: EDUC 321, EDUC 322, EDUC 389, EDUC 451, EDUC 481, EDUC 482, EDUC 483, EDUC 486, admission to School of Education. Coreq: EDUC 485. {Also offered for graduate credit - see EDUC 687P.}.

EDUC 488. Applied Student Teaching. 3 Credits.
Guided student teaching experience including application of lesson planning, portfolio development, professional goal-setting, and supervised teaching in an approved and accredited school. Prereq: Admission to School of Education, completion of professional education sequence. Coreq: EDUC 485 or H&CE 483P, EDUC 487. Cross-listed with H&CE 488. {Also offered for graduate credit - see EDUC 688P.}.

EDUC 489. Teaching Students of Diverse Backgrounds. 3 Credits.
This class places emphasis on cultural diversity and teaching diverse students including Native Americans. Strategies for creating learning environments that contribute to positive human relationships, and strategies for teaching and assessing diverse learners are included. Prereq: EDUC 321, EDUC 322 and admission to the School of Education. {Also offered for graduate credit - see EDUC 689.}.

EDUC 491. Seminar. 1-5 Credits.

EDUC 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

EDUC 494. Individual Study. 1-5 Credits.

EDUC 496. Field Experience. 1-15 Credits.

EDUC 499. Special Topics. 1-5 Credits.

EDUC 616. Teacher Education in International Comparative Perspective. 2 Credits.
Exploring teacher education in international contexts by comparing approaches to program development, examining curriculum characteristics, analyzing policies and investigating practices of teaching and learning in different countries. {Also available for undergraduate credit - see EDUC 416}.

EDUC 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 655. Socio-Psycho-Linguistics for Teachers of English Language Learners. 3 Credits.
This course will explore how language shapes culture and vice versa, considering how assumptions, prejudices and biases toward varying language affect the classroom and ELLs. Prereq: EDUC 654. {Also offered for undergraduate credit - see EDUC 455.}.

EDUC 661. Introduction to Special Education. 3 Credits.
Develops skills and knowledge for recognizing and effectively teaching students with various disabilities in the K-12 setting. Examines relevant laws, educational service delivery models, curricular planning approaches, and instructional adaptations. Ten hours of field experience is required. Prereq: Admission to graduate program. {Also offered for undergraduate credit - See EDUC 461.}.

EDUC 663. Inclusive Instructional Planning Across the K-12 Setting. 3 Credits.
Curriculum development aligned with general education content for students with disabilities. Identifying appropriate IEP goals, supplementary aids and services, and service coordination in K-12 inclusive school contexts will be emphasized. Ten hours of field experience is required. {Also available for undergraduate credit - see EDUC 463.}.

EDUC 664. Universal Design for Learning in K-12 Settings. 3 Credits.
Introduces the Universal Design for Learning (UDL) framework. Examines how it can provide guidance for designing inclusive pedagogies to address barriers to K-12 students' learning related to instruction, assessment, and learning environments. Explores theoretical relationship to Disabilities Studies in Education, models of disability, and implications for K-12 educators' practices.

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 Practice/Methods of Teaching II. 2-3 Credits.
Specialized methods and classroom practices appropriate to the specific subject area. {Also offered for undergraduate credit - see EDUC 482.}.

EDUC 683P. Classroom Practice/Methods of Teaching III. 2-3 Credits.
Specialized methods and classroom practices appropriate to the specific subject area. {Also offered for undergraduate credit - see EDUC 483.}.

EDUC 685P. Student Teaching Seminar. 1 Credit.
Orientation to student teaching. Analysis of professional issues and concerns associated with education. Prereq: EDUC 689P, EDUC 651P, EDUC 683P, EDUC 686P. Coreq: EDUC 687P. {Also offered for undergraduate credit - see EDUC 485.}.

EDUC 686. Classroom Management for Diverse Learners. 3 Credits.
Teacher candidates develop a plan to establish an effective management system encompassing the total classroom environment. {Also offered for undergraduate credit - see EDUC 486.}.

EDUC 687P. Student Teaching. 9 Credits.
Supervised teaching in an approved and accredited school. Includes an on-campus seminar. Prereq: EDUC 689P, EDUC 651P, EDUC 681P, EDUC 682P, EDUC 683P, EDUC 686P. Coreq: EDUC 685P. {Also offered for undergraduate credit - see EDUC 487.}.

EDUC 688P. Applied Student Teaching. 3 Credits.
Guided student teaching experience including application of lesson planning, portfolio development, professional goal-setting, and supervised teaching in an approved and accredited school. Coreq: EDUC 685P, EDUC 687P. Cross-listed with H&CE 688P. {Also offered for undergraduate credit - see EDUC 488.}.

EDUC 689. Teaching Students of Diverse Backgrounds. 3 Credits.
This class places emphasis on cultural diversity and teaching diverse students including Native Americans. Strategies for creating learning environments that contribute to positive human relationships, and strategies for teaching and assessing diverse learners are included. {Also offered for undergraduate credit - see EDUC 489.}.

EDUC 690. Graduate Seminar. 1-3 Credits.

EDUC 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

EDUC 695. Field Experience. 1-15 Credits.

EDUC 696. Special Topics. 1-5 Credits.

EDUC 702. Statistics In Educational Research. 3 Credits.
Basic theory, techniques for using descriptive and inferential statistics, application of appropriate statistical procedures, analysis and interpretation of results, and practice in the reporting of the results in appropriate formats for scholarly papers and presentations.

EDUC 703. Research, Measurement and Program Evaluation. 3 Credits.
A broad overview of methodology and design of research studies in education.

EDUC 704. Collegiate Environments. 3 Credits.
The purpose of this course is to understand college student populations, campus environments, and their interactions. By exploring the influences of campus environments on students' experiences, as well as how students influence environments, this course will provide opportunities to learn how to enhance campus environments to maximize student success. Additionally, integrating concepts and issues related to safety, inclusion, equity, campus climate, and retention, is imperative to understanding how to build environments that are responsive to the increasingly diverse characteristics of U.S. college students.

EDUC 706. Theories of College Student Development. 3 Credits.
This course examines how college students develop and learn. It is designed to introduce graduate students to major theoretical perspectives, the scholarship based on those perspectives, and how each can be used to design educational policies and practices that promote college student learning and development.

EDUC 707. Organization and Administration of Higher Education. 3 Credits.
This course deals with the organization and administration of higher education and the current and evolving problems and possibilities for higher education. Prereq: Admission to graduate program in Education.

EDUC 708. Higher Education Student Affairs and Enrollment Management. 3 Credits.
The purpose of this course is to teach about the role of student affairs professionals in schools, colleges, and other educational organizations, including recruitment, selection, orientation, development, compensation, and evaluations. Prereq: Admission to a graduate program in Education.

EDUC 709. Financing Higher Education. 3 Credits.
This course provides funding theories and procedures necessary to develop and maintain financing for higher education institutions. Prereq: Admission to a graduate program in Education.

EDUC 710. Philosophy of Education. 2 Credits.
Major philosophical concepts and principles of education from Plato to the present.

EDUC 712. Social, Cultural and Political Dimensions of Schools. 3 Credits.
Social processes and interaction among diverse populations in educational settings. Relationship of schools to society.

EDUC 714. History of American Education. 2 Credits.
Historical and intellectual development of education in the United States from the colonial period to the present.

EDUC 715. The Superintendency. 2 Credits.
This course deals with examining the role and functions of the public school district administrator.

EDUC 720. Supervision of Student Teachers. 2 Credits.
Planning and carrying out effective supervision techniques when supervising student teachers in respective subjects.

EDUC 724. Advanced Educational Psychology. 3 Credits.
Principles of effective human learning. Discussion of learning theories, the teacher as a director of learning experiences, and factors influencing students representing a variety of cultures and abilities in the educational setting.

EDUC 728. Instructional Technology for Teaching and Learning. 3 Credits.
This course provides an advanced understanding of technology concepts and contemporary computer-based programs for the teaching and learning processes. Prereq: Admission to doctoral program.

EDUC 730. Leadership, Planning and Organizational Behavior. 3 Credits.
Introduction to models of educational leadership including organizational structure, theory, and leadership styles. Consideration of concepts, problems, and issues in administration.

EDUC 731. Educational Law and Policy. 3 Credits.
Examination of the legislative and judicial actions affecting the public schools. Consideration is given to contemporary legal issues for teachers, administrators, and boards.

EDUC 732. Curriculum, Instruction and Learning Theory. 3 Credits.
Investigation of curricular decision-making and program evaluation strategies as they affect the educational program. Problem-solving skills are presented through theory and simulation. Prereq: EDUC 730.

EDUC 733. Technology and Information Systems. 3 Credits.
Provides an understanding of selected computer applications for educational administrators at the building and district office levels.

EDUC 734. Personal Communication & Ethics. 3 Credits.
Prepares aspiring school leaders to plan for their personal and professional development and to understand and use the principles of communication, ethics, and values.

EDUC 735. Personnel, Supervision and Staff Development. 3 Credits.
Specific techniques and systems to supervise instruction. Review of interpersonal communication and group process skills as applied to administrative supervision. Prereq: EDUC 730.

EDUC 736. Policy and Educational Finance. 3 Credits.
Provides school leaders with an understanding of managing and allocating resources in a political climate in which policy decisions are based on historical resource allocations.

EDUC 738. Administration of K-12 Schools. 3 Credits.
The course provides school leaders with common elements of leadership and management as they apply to the K-12 principalship. Practical applications in the K-12 setting will be considered. Prereq: EDUC 730.

EDUC 739. Administration of Secondary Schools. 2 Credits.
Common elements of leadership as they apply to the principalship. Consideration of practical applications in a secondary school setting. Prereq: EDUC 730.

EDUC 742. Elementary School Curriculum. 2 Credits.
History, development, evaluation, and revision of the curriculum. Review of recent research in elementary school curriculum.

EDUC 743. Secondary School Curriculum. 2 Credits.
Study of contemporary curriculum patterns with emphasis on curricular construction and evaluation.

EDUC 750. Reflective Practice and Research in Education. 3 Credits.
The development of reflective practices in educational settings for the purpose of improvement and growth. An overview of educational research aligned with the goal of informing practice and improving educational institutions.

EDUC 751. Students and Their Learning. 3 Credits.
Exploration of student differences and ways of adjusting teaching practice to meet individual needs and promote the equitable treatment of students. Application of learning theories to educate the whole child (cognitive, affective, social).

EDUC 752. Curriculum Design and Delivery. 3 Credits.
An inquiry-based course for the reflective practitioner to develop deep understandings of curriculum content emphasized by state and national standards documents and to acquire an effective repertoire of instructional skills.

EDUC 753. Managing/ and Monitoring Learning. 3 Credits.
This course is based on the concept that assessment drives instruction. A working definition of student learning will be defined. Multiple measures of assessment will be investigated and impacts in student learning will be explored.

EDUC 755. Exceptional Learners in the Secondary School Classroom. 3 Credits.
Legal and ethical requirements for educating exceptional learners; identification, referral, and placement procedures; development and use of the Individual Education Program; strategies for teaching and evaluating; managing academic and social behaviors of exceptional learners.

EDUC 775. Content Area Reading. 2 Credits.
Examination of content, instructional methodologies, and evaluation techniques for reading in content classes.

EDUC 778. School Fund Management. 3 Credits.
Proper recording and reporting of financial accounts for elementary and secondary schools. Use of procedures and concepts for governmental fund accounting and financial management. Prereq: M.S. Educational Administration.

EDUC 784. School Personnel Administration. 2 Credits.
Study of personnel administration in public school systems. Includes an examination of the purposes, policies, plans, procedures, and personnel administration. Prereq: EDUC 782.

EDUC 789. School Community Relations. 2 Credits.
Purposes, organization, agencies, and criteria of good school-community relationships; knowledge and techniques for effective public relations. Prereq: EDUC 739, M.S. in Educational Administration.

EDUC 790. Graduate Seminar. 1-5 Credits.

EDUC 791. Temporary/Trial Topics. 1-5 Credits.

EDUC 792. Graduate Teaching Experience. 1-6 Credits.
Graduate student teaching experiences for professional development. S/U grading.

EDUC 793. Individual Study/Tutorial. 1-5 Credits.

EDUC 794. Practicum/Internship. 1-8 Credits.

EDUC 795. Field Experience. 1-15 Credits.

EDUC 796. Special Topics. 1-5 Credits.

EDUC 797. Master's Paper. 1-3 Credits.

EDUC 797S. Comprehensive Project. 1-6 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-postivism, interpretive/constructivist and orientational paradigms with emphasis on reflective planning of studies. Prereq: admission to Doctoral program.

EDUC 803. Philosophical Foundations of Education. 3 Credits.
Through the examination of historical contexts and differing philosophical traditions within the field of education, students will reflect on and shape an informed and critical philosophy for their own scholarship and educational praxis. Admission to the Educational Doctoral Program is required.

EDUC 806. International and Comparative Education. 3 Credits.
The aim of this course is to add an international lens to our understanding of learning and education. Emphasizes globalization, comparative methods, policy, education as development, and analyzing teaching and learning within different national contexts.

EDUC 807. Diversity and Educational Policy. 3 Credits.
This course explores diversity in educational settings and investigates the purpose and implementation of educational policies related to access and services for diverse populations historically, presently, and in preparation for potential future needs.

EDUC 808. Empowerment & Transformative Education. 3 Credits.
An examination of theory, research and practice in individual and group transformation, empowerment, and advocacy development within multicultural and diverse learning contexts.

EDUC 811. Organizational Culture. 3 Credits.
This course examines organizational culture, including how culture is created, maintained, and changed through interaction. The course emphasizes deciphering organizational culture so that the decisions and actions taken by educational leaders will have greater impact on their organizations. Prereq: Admission to doctoral program in Education or consent of the instructor.

EDUC 812. Leadership in Educational Institutions. 3 Credits.
This course provides an in-depth overview of contemporary and classic theories of organizational leadership, with specific attention to the application of existing theories to educational institutions. This course addresses the implications of leadership across contexts, cultures, and time with an emphasis on understanding and appreciating the challenges faced by leaders in modern educational institutions. Prereq: Admission to doctoral program in Education or consent of the instructor.

EDUC 813. Educational Innovation and Change. 3 Credits.
This course introduces the field of organizational change, including providing an overview and analysis of the change process and the various strategies for planning and implementing change. The course will emphasize the nature, characteristics, responsibilities, and contextual determinants that influence a leader's role in changing educational organizations. Prereq: Admission to doctoral program in Education or consent of the instructor.

EDUC 831. Institutional Quality Control. 3 Credits.
History and effecting of quality control will be briefly reviewed. Global, U.S. societal, state government, accreditation, and student accountability forces will be elucidated. Successful, failed, and future institutional responses to these forces will be discussed. Prereq: Admission to doctoral program.

EDUC 832. Assessment Techniques for Educational Institutions. 3 Credits.
This course addresses all aspects of educational assessments in order to select the assessment technique that meets specific accountability mandates in the field of education. Prereq: Admission to doctoral program.

EDUC 833. Strategic Planning for Institutional Improvement. 3 Credits.
The role of strategic planning in educational institutions and its relationship to institutional improvement and effectiveness will be explored. Approaches to implementation of strategic plans designed to address institutional goals will also be discussed.

EDUC 844. Higher Education Law. 3 Credits.
To develop expertise in legal issues for students whose current positions or future career goals include administrative and management positions in higher education where they will work on legal issues with attorneys. Prereq: Admission to doctoral program.

EDUC 851. Adult Learning. 3 Credits.
Contextual influences and theoretical perspectives specific to adult learning. Theories of adult growth and development. Physical and cognitive changes throughout adulthood and other factors that have implications for the learning and teaching of adults.

EDUC 852. Foundations of Occupational & Adult Education. 3 Credits.
This course explores the nature, function, and scope of occupational and adult education. The course provides both knowledge of the history of occupational and adult education and an appreciation of historical and philosophical perspectives.

EDUC 853. Instructional Methods for Adult Learners. 3 Credits.
This course provides educators with ways to understand adult learning and to facilitate the teaching and learning transaction through an array of methods. Emphasis is on the relationship of current research to contemporary practice.

EDUC 863. Education and Training for Business and Industry. 3 Credits.
The purpose of this course is to teach the fundamentals necessary to educate and train people for the workforce according to evolving training needs of business, industry, military and government. Prereq: Admission to doctoral program.

EDUC 871. Planning and Conducting Needs Assessment. 3 Credits.
A three-phase model will be compared and contrasted to provide the skill and knowledge necessary for conducting needs assessments for educational schools and institutions. Prereq: Admission to doctoral program.

EDUC 872. Qualitative Research Methods. 3 Credits.
This course introduces foundational theories and approaches to qualitative research for education settings, including the identification and critique of various types of qualitative research, data collection techniques, approaches to coding, analysis, interpretation, and write-up. Prereq: Admission to doctoral program.

EDUC 873. Case-Based Educational Research and Statistics. 3 Credits.
The purpose of this course is to have graduate students understand statistical meanings and concepts which will provide the professional expertise needed to serve schools and institutions with their contemporary research and accountability needs. Prereq: Admission to doctoral program.

EDUC 881. Computer Data Management and Decision Making. 3 Credits.
Interpretation of effective computer applications for computer use as a decision-making and planning tool for school finance and managerial functions relating to the field of school business administration and school district superintendency. Prereq: EDUC 730, 10 credits in Educational Administration.

EDUC 882. Institutional Analysis Techniques. 3 Credits.
Surveys, focus groups, longitudinal studies, national data sets, correct statistical design and analyses, and effective reporting techniques will be reviewed and utilized in depth to address questions of institutional performance in academic and student affairs. Prereq: Admission to doctoral program.

EDUC 883. Survey Research. 3 Credits.
The study of theory, method, and techniques for conceptualizing and conducting survey research will be explored including survey design, administration, and data management.

EDUC 884. Program Evaluation Research. 3 Credits.
Major theoretical approaches to the evaluation of educational programs are reviewed, analyzed, and critiqued. Pragmatic implications for educational and social policy are addressed, as well as constructive impact on program decision-making. Prereq: Admission to doctoral program.

EDUC 885. Structural Equation Modeling Fundamentals. 3 Credits.
Conceptual and mathematical foundations of structural equation modeling techniques will be presented. Application to education research including model specification, testing, and interpretation using appropriate software will be emphasized. Prereq: EDUC 873.

EDUC 886. Advanced Qualitative Research. 3 Credits.
Examines diverse theoretical frameworks, methodologies, techniques and designs for qualitative research. Further expands requisite knowledge and analysis skills needed for the completion of research projects employing qualitative methods and research procedures. Admission to the Educational Doctoral Program is required.

EDUC 890. Graduate Seminar. 1-5 Credits.

EDUC 892. Graduate Teaching Experience. 1-6 Credits.
Graduate student teaching experiences for professional development. S/U grading.

EDUC 893. Individual Study/Tutorial. 1-5 Credits.

EDUC 894. Practicum/Internship. 1-8 Credits.

EDUC 896. Special Topics. 1-5 Credits.

EDUC 899. Doctoral Dissertation. 1-15 Credits.

Electrical & Computer Engineering (ECE)

ECE 111. Introduction to Electrical and Computer Engineering. 3 Credits.
Introduction to electrical and computer engineering problem solving, design and professional issues. 3 lectures. Prereq: MATH 103.

ECE 173. Introduction to Computing. 4 Credits.
Programming in a high level language with applications to engineering computation, analysis, and design. 3 lectures, 1 2-hour laboratory. Prereq: MATH 103 or higher.

ECE 193. Undergraduate Research. 1-5 Credits.

ECE 194. Individual Study. 1-5 Credits.

ECE 196. Field Experience. 1-15 Credits.

ECE 199. Special Topics. 1-5 Credits.

ECE 275. Digital Design. 4 Credits.
Introduction to computer arithmetic, designing combinatorial circuits, and designing basic sequential circuits. 3 lectures, 1 two-hour laboratory. Prereq: MATH 105.

ECE 291. Seminar. 1-3 Credits.

ECE 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ECE 293. Undergraduate Research. 1-5 Credits.

ECE 294. Individual Study. 1-5 Credits.

ECE 299. Special Topics. 1-5 Credits.

ECE 301. Electrical Engineering I. 3 Credits.
Introduction to electrical engineering for non-majors. Fundamental laws of circuit analysis. Steady-state and transient analysis of DC and AC circuits. 3 lectures. Prereq: MATH 259 or MATH 265, PHYS 252.

ECE 303. Electrical Engineering II. 3 Credits.
Electronic circuits and their applications. Electromechanical energy conversion. Transformers, DC and AC machines. 3 lectures. Prereq: ECE 301.

ECE 306. Electrical Engineering Lab I. 1 Credit.
Electronic instruments and measurements. Applications to electrical and electronic circuits, power devices, and systems. 1 two-hour laboratory. Prereq: ECE 301.

ECE 311. Circuit Analysis II. 4 Credits.
Analysis of single-phase and three-phase circuits. Laplace transforms in circuit analysis. Fourier series. Two-port networks. 3 one-hour lectures, 1 two-hour laboratory. Prereq: EE 206 with a grade of C or better. Coreq: MATH 266.

ECE 320. Electronics I. 3 Credits.
Characterization, modeling, and analysis of digital circuits using diodes, BJTs, FETs, and Op Amps. 4 one-hour lectures, 1 two-hour laboratory each week for 10 weeks. Prereq: EE 206.

ECE 321. Electronics II. 2 Credits.
Characterization, modeling, and analysis of digital and analog circuits using diodes, BJTs, FETs, and Op Amps. 1 one-hour lecture, 1 two-hour laboratory each week for 6 weeks. Prereq: EE 206.

ECE 331. Energy Conversion. 4 Credits.
Magnetic circuits, transformers, DC and AC rotating machines. 3 one-hour lectures, 1 two-hour laboratory. Coreq: ECE 311.

ECE 341. Random Processes. 3 Credits.
Principles of probability. Application of probability and statistics to electrical and computer engineering problems. 3 lectures. Prereq: MATH 266.

ECE 343. Signals & Systems. 4 Credits.
Discrete-time and continuous-time signals and systems. Linearity, frequency response, difference and differential equations, transform techniques. Course covers a variety of essential mathematical concepts including complex arithmetic, difference and differential equations, convolution, Laplace transforms, z-transforms, and various Fourier representations. Prereq: ECE 311.

ECE 351. Applied Electromagnetics. 4 Credits.
Lecture and laboratory introduction to electromagnetic waves in linear media, effects of boundaries, transmission lines, electrostatics, and magnetostatics. Introduction to time dependence and engineering applications. 4 lectures, 1 two-hour laboratory. Coreq: ECE 311.

ECE 373. Assembly Programming. 3 Credits.
Machine language, assembly language, and related hardware concepts, assembly language programming, macros and subroutines, system facilities and macros. Prereq: ECE 173, ECE 275 with a grade of C or better. Cross-listed with CSCI 373.

ECE 374. Computer Organization. 4 Credits.
Organization and structure of the major sections of a computer: CPU, memory, and I/O system organization and implementation issues. 3 lectures, 1 two-hour VHDL-based laboratory. Prereq: ECE 173, ECE 275 with a grade of C or better.

ECE 375. Digital Design 2. 3 Credits.
Sequential circuit design, design of optimized arithmetic circuits including adders, subtractors, multipliers and dividers, floating point arithmetic, and behavioral and structural VHDL. 2 lectures, 1 two-hour laboratory. Prereq: ECE 173, ECE 275.

ECE 376. Embedded Systems. 4 Credits.
Use of microcontrollers for data acquisition and device control. Includes assembly language and high-level programming, serial and parallel I/O, timers and interface design. 3 lectures, 1 two-hour laboratory. Prereq: ECE 173, ECE 275, EE 206.

ECE 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ECE 391. Seminar. 1-3 Credits.

ECE 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ECE 393. Undergraduate Research. 1-5 Credits.

ECE 394. Individual Study. 1-3 Credits.

ECE 397. Fe/Coop Ed/Internship. 1-4 Credits.

ECE 399. Special Topics. 1-5 Credits.

ECE 401. Design I. 1 Credit.
Capstone experience in formulation and design of a system or device. Basic project planning and software tools. 1 lecture. Coreq: ECE 320.

ECE 403. Design II. 2 Credits.
Capstone experience in formulation and design of a system or device. 2 two-hour design laboratories. Prereq: ECE 401, Senior standing.

ECE 405. Design III. 3 Credits.
Capstone experience in formulation and design of a system or device. 3 two-hours design laboratories. Prereq: ECE 403.

ECE 411. Optics for Scientists and Engineers. 3 Credits.
Introduction to modern optics. Geometric optics, electromagnetic nature of light, polarization, interference, diffraction, fiber optics. Prereq: PHYS 252. Co-req: ECE 411L. Cross-listed with PHYS 411. {Also offered for graduate credit - see ECE 611.}.

ECE 411L. Optics for Scientists and Engineers Laboratory. 1 Credit.
Required laboratory for ECE/PHYS 411. Ten optics experiments plus a major-related optics project. Prereq: PHYS 252. Co-req: ECE 411. {Also offered for graduate credit - see 611L.}.

ECE 413. Lasers for Scientists and Engineers. 3 Credits.
Lecture and laboratory introduction to lasers. Spontaneous and stimulated transitions, line-broadening, gain, gain saturation, optical resonators, Fabry-Perot interferometers, theory of laser oscillation, rate equations, transverse modes, coherence, and Gaussian beams. Prereq: PHYS 252. Cross-listed with PHYS 413. {Also available for graduate credit - See ECE 613.}.

ECE 415. Elements of Photonics. 3 Credits.
Analysis of optical systems using the matrix formulation, wave propagation in anisotropic media, electro-optic effect and laser modulation, physical origin of optical non-linearities, phase matching, optical second harmonic and parametric generation. Prereq: PHYS 252. Cross-listed with PHYS 415. {Also offered for graduate credit - See ECE 615.}.

ECE 417. Optical Signal Transmission. 3 Credits.
Optical signal transmission including geometric optics and modal analysis for homogeneous and inhomogeneous light guides. Systems studies including coupling, inter-symbol interference, sources, photodetectors, and modulation. Prereq: ECE 351. Cross-listed with PHYS 417. {Also offered for graduate credit - see ECE 617.}.

ECE 421. Communication Circuits. 3 Credits.
Resonant circuits and tuned amplifiers, oscillators, modulators and demodulators, phase-locked loops, and power amplifiers. Analysis, design, and applications in communication systems. 3 lectures. Prereq: ECE 321. {Also offered for graduate credit - see ECE 621.}.

ECE 423. VLSI Design. 3 Credits.
Analysis and design of digital integrated circuits. Characteristics and applications of logic gates and regenerative logic circuits. 3 lectures. Prereq: ECE 320. {Also offered for graduate credit - see ECE 623.}.

ECE 424. Analog VLSI. 3 Credits.
Design, analysis, and simulation of analog VLSI circuits including operational amplifiers, current mode circuits, oscillators, translinear circuits, and phase locked-loops. Design automation for analog circuits. Prereq: ECE 311, ECE 321. {Also offered for graduate credit - see ECE 624.}.

ECE 425. Introduction to Semiconductor Devices. 3 Credits.
Properties and applications of semiconductors and solid-state electronic devices. Semiconductors, junctions, and transistors. 3 lectures. Prereq: ECE 320. {Also offered for graduate credit - see ECE 625.}.

ECE 426. Nanoelectronics. 3 Credits.
This course is designed to provide students with knowledge and understanding of physical background and applications of nanoelectronics, which reflects science and technology after the silicon-based microelectronics. The course will cover electrical and optical properties of materials and nanostructures, fabrication of nanostructures, nanoelectronic devices including resonant-tunneling devices, transistors, and single-electron transfer devices, as well as engineering applications of nanoscience and nanotechnology. Prereq: MATH 266, PHYS 252 and ECE 320.

ECE 427. Packaging for Electronics. 3 Credits.
Processes and materials for packaging of electronic components and devices, including integrated circuit chips, chip packages, and board level packaged systems; boards and substrates technology; quality and reliability of electronic packages. Open to all engineering majors. Prereq: Junior standing. Cross-listed with IME 427. {Also offered for graduate credit - see ECE 627.}.

ECE 429. Introduction to IC Fabrication. 3 Credits.
This course examines issues about fabrication methods and procedures. Topics will include implantation, pattern transfer and process integration. Cross-listed with IME 429. {Also offered for graduate credit - see ECE 629.}.

ECE 431. Power Systems. 3 Credits.
Electrical characteristics of high voltage lines. Symmetrical components, per unit system, and transformers. Matrix methods, load flow, and fault analysis. 3 lectures. Prereq: ECE 311. {Also offered for graduate credit - see ECE 631.}.

ECE 432. Computational Methods in Power Systems. 3 Credits.
Power flow, optimal power flow, state estimation, contingency analysis, unit commitment, security assessment, small signal and dynamic stability, voltage stability, emerging algorithms for blackout and vulnerability assessment in power systems. Co-req: ECE 431. {Also offered for graduate credit - see ECE 632.}.

ECE 433. Power Systems Design. 3 Credits.
Unbalanced power systems, economic dispatch, transients in power systems, power system stability, power system protection. 3 lectures. Prereq: ECE 311. {Also offered for graduate credit - see ECE 633.}.

ECE 437. Power Electronics. 3 Credits.
Characteristics and modeling of power electronic devices. Rectifiers, choppers, and inverters and their applications in power supplies and motor drives. 3 lectures. Prereq: ECE 321. {Also offered for graduate credit - see ECE 637.}.

ECE 438. Electric Drives. 4 Credits.
Characteristics of loads and drive train, power converters, four quadrant ac/dc drives, DSP control, drives for special motors, applications including electric vehicles. 3 lectures, 1 two-hour laboratory. Prereq: ECE 331 with a grade of C or better, ECE 437 with a grade of C or better. {Also offered for graduate credit - see ECE 638.}.

ECE 443. Communications I. 4 Credits.
Communications theory and design with an emphasis on spectral techniques. Modulation and noise effects. 3 lectures, 1 two-hour laboratory. Prereq: ECE 341 and ECE 343. {Also offered for graduate credit - see ECE 643.}.

ECE 444. Applied Digital Signal Processing. 3 Credits.
Digital signal processing theory balanced with practical application. Includes design of FIR, IIR, and adaptive filters; Fast Fourier Transforms; sampling theory; implementation techniques; multi-rate processing. Emphasizes system implementation using development tools and DSP hardware. 3 lectures. Prereq: ECE 173, ECE 343. {Also offered for graduate credit - see ECE 644.}.

ECE 445. Communications II. 3 Credits.
Continuation of ECE 443. Digital communications systems. Optimum receivers. Information theory and coding. 2 lectures. Prereq: ECE 443. {Also offered for graduate credit - see ECE 645.}.

ECE 448. Image Analysis I. 3 Credits.
Image acquisition, resolution, enhancement, restoration, and equalization. Illuminations, reflectance, and noise considerations. Segmentation, shape characterization, and object recognition. Simulation examples, computer problems, and gathering of actual scientific images via camera and computer. Prereq: EC 343 or instructor approval. {Also offered for graduate credit - see ECE 648.}.

ECE 451. RF and Microwave Circuit Analysis and Design for Wireless Systems. 3 Credits.
This course will focus on the analysis and design of Radio Frequency (RF) and microwave circuits. In particular, circuits such as oscillators, filters, power dividers, amplifiers, mixers and modulators will be studied for wireless systems. Prereq: ECE 321 and ECE 351. {Also offered for graduate credit - see ECE 651.}.

ECE 453. Signal Integrity. 3 Credits.
Topics in system level signal integrity are presented. The construction and design of passive printed circuit cards are discussed, with computer aided design software used for analysis and class presentations. Circuit card fabrication issues and case examples of applications are discussed. Prereq: ECE 311, ECE 351. {Also offered for graduate credit - see ECE 653.}.

ECE 455. Designing for Electromagnetic Compatibility. 3 Credits.
Principles and methods concerning electronic system designs that are not sources of or susceptible to electromagnetic interference. 3 lectures. Laboratory. Prereq: ECE 343, ECE 351. {Also offered for graduate credit - see ECE 655.}.

ECE 461. Control Systems I. 4 Credits.
Modeling and control of dynamic systems, including root-locus, Bode plots, and Nichols charts. 3 lectures, 1 two-hour laboratory. Prereq: ECE 343. {Also offered for graduate credit - see ECE 661.}.

ECE 463. Modern Control. 3 Credits.
Analysis and design of controllers for linear and non-linear systems using state-space methods. Design to specifications, controllability, observability, stability, optimization, and state-estimation. 3 lectures. Prereq: ECE 343. {Also offered for graduate credit - see ECE 663.}.

ECE 470. Fault Tolerant Digital Systems. 3 Credits.
Design and analysis of reliable digital systems through robust information coding, fault avoidance, and fault-tolerance. 3 lectures. Prereq: ECE 275. {Also offered for graduate credit - see ECE 670.}.

ECE 471. Computer Systems Design and Implementation. 3 Credits.
Design and implementation of reliable, interrupt driven systems. Use of development tools. System components issues including co-processors, buses, run-time. Prereq: ECE 376, ECE 401, CSCI 474.

ECE 472. Design Automation of VLSI Circuits. 3 Credits.
Electronic design automation algorithms utilized by software tools, which are used for the design automation of VLSI integrated circuits. This course will cover design steps including circuit synthesis, technology mapping, formal verification, floorplanning, placement, and routing. Prereq: ECE 173, 275 with a grade of C or better. {Also offered for graduate credit - see ECE 672.}.

ECE 474. Computer Architecture. 3 Credits.
Topics pertaining to computer architecture will include: pipelining, caches, memory, I/O superscalar and out-of-order instruction execution, speculative execution, vector execution, multithreading, and multiprocessors. Prereq: ECE 374. {Also offered for graduate credit - see ECE 674.}.

ECE 476. Advanced Embedded Systems. 4 Credits.
Specification, design, development, and test of modern embedded systems using a high-level programming language. 3 lectures, 1 two-hour laboratory. Prereq: ECE 376. {Also available for graduate credit, See ECE 676.}.

ECE 477. Hardware Design for Machine Learning. 3 Credits.
Hardware-aware neural network (NN) design in NVidia Developer kit with OpenCV python programming. MAC design for NN and alternate neural network implementations using emerging technologies. Advanced topics in Hardware-aware neural network designs such as Binary nets, FFT-based neural nets, In-compute Memory and near-compute memory. 2 lectures, 1 two-hour laboratory. Prereq: ECE 374 and ECE 375. {Also offered for graduate credit - See ECE 677.}.

ECE 479. Formal Verification. 3 Credits.
Formal verification methods for hardware, software, and embedded 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. Prereq: ECE 275 and ECE 173 or CSCI 160. {Also offered for undergraduate credit - see ECE 679.}.

ECE 483. Instrumentation for Engineers. 3 Credits.
Study of instrumentation including design, fabrication, and application. Prereq: Senior standing. {Also offered for graduate credit - see ECE 683.}.

ECE 485. Biomedical Engineering. 3 Credits.
Unified study of engineering techniques and basic principles in physiological systems. Focus on membrane biophysics, biological modeling, compartmental analysis, and systems control theory. Prereq: Senior standing. {Also offered for graduate credit - see ECE 685.}.

ECE 486. Biosensing Technology. 3 Credits.
Biosensors are defined as analytical devices incorporating a biological material, a biologically derived material or a biomimic associated with or integrated within a physicochemical transducer or transducing microsystem, which may be optical, electrochemical, thermometric, piezoelectric, magnetic or micromechanical. This course provides instruction in the basic science and engineering concepts required to understand the design and application of biosensors. This module serves as an introduction to some of the biosensors and measurement techniques. Prereq: Senior standing. {Also available for graduate credit - see ECE 686.}.

ECE 487. Cardiovascular Engineering. 3 Credits.
This course includes the application of engineering techniques to cardiovascular physiology and medicine. Basic cardiac and vascular physiology will be presented, modeling techniques will be examined. Instrumentation, measurement theory, and assist devices will be discussed. Prereq: Senior standing. {Also offered for graduate credit - see ECE 687.}.

ECE 488. Cardiovascular Engineering II. 3 Credits.
Analysis, design, and research methods related to modeling and simulating the cardiovascular system. Prereq: ECE 487. {Also offered for graduate credit - see ECE 688.}.

ECE 491. Seminar. 1-5 Credits.

ECE 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ECE 493. Undergraduate Research. 1-5 Credits.

ECE 494. Individual Study. 1-5 Credits.

ECE 496. Field Experience. 1-15 Credits.

ECE 499. Special Topics. 1-5 Credits.

ECE 611. Optics for Scientists and Engineers. 3 Credits.
Introduction to modern optics. Geometric optics, electromagnetic nature of light, polarization, interference, diffraction, fiber optics. Corequisite laboratory with major related optics project. Coreq: PHYS 611L. Cross-listed with PHYS 611. {Also offered for undergraduate credit - see ECE 411.}.

ECE 611L. Optics for Scientists and Engineers Laboratory. 1 Credit.
Required laboratory for PHYS 611 or ECE 611. Ten optics experiments plus a major related optics project. Coreq: PHYS 611. Cross-listed with PHYS 611L. {Also offered for undergraduate credit - see ECE 411L.}.

ECE 613. Lasers for Scientists and Engineers. 3 Credits.
Lecture and laboratory introduction to lasers. Spontaneous and stimulated transitions, line-broadening, gain, gain saturation, optical resonators, Fabry-Perot interferometers, theory of laser oscillation, rate equations, transverse modes, coherence, and Gaussian beams. Cross-listed with PHYS 613. {Also available for undergraduate credit - See ECE 413.}.

ECE 615. Elements of Photonics. 3 Credits.
Analysis of optical systems using the matrix formulation, wave propagation in anisotropic media, electro-optic effect and laser modulation, physical origin of optical non-linearities, phase matching, optical second harmonic and parametric generation. Cross-listed with PHYS 615. {Also offered for undergraduate credit - See ECE 415.}.

ECE 617. Optical Signal Transmission. 3 Credits.
Optical signal transmission including geometric optics and modal analysis for homogeneous and inhomogeneous light guides. Systems studies including coupling, inter-symbol interference, sources, photodetectors, and modulation. Cross-listed with PHYS 617. {Also offered for undergraduate credit - see ECE 417.}.

ECE 621. Communications Circuits. 3 Credits.
Resonant circuits and tuned amplifiers, oscillators, modulators and demodulators, phase-locked loops, and power amplifiers. Analysis, design, and applications in communication systems. 3 lectures. S {Also offered for undergraduate credit - see ECE 421.}.

ECE 623. VLSI Design. 3 Credits.
Analysis and design of digital integrated circuits. Characteristics and applications of logic gates and regenerative logic circuits. 3 lectures. {Also offered for undergraduate credit - see ECE 423.}.

ECE 624. Analog VLSI. 3 Credits.
Design, analysis, and simulation of analog VLSI circuits including operational amplifiers, current mode circuits, oscillators, translinear circuits, and phase locked-loops. Design automation for analog circuits. {Also offered for undergraduate credit - see ECE 424.}.

ECE 625. Introduction to Semiconductor Devices. 3 Credits.
Properties and applications of semiconductors and solid-state electronic devices. Semiconductors, junctions, and transistors. 3 lectures. F/2 {Also offered for undergraduate credit - see ECE 425.}.

ECE 627. Packaging for Electronics. 3 Credits.
Processes and materials for packaging of electronic components and devices, including integrated circuit chips, chip packages, and board level packaged systems; boards and substrates technology; quality and reliability of electronic packages. Open to all engineering majors. Cross-listed with IME 627. {Also offered for undergraduate credit - see ECE 427.}.

ECE 629. Introduction to IC Fabrication. 3 Credits.
This course examines issues about fabrication methods and procedures. Topics will include implantation, pattern transfer and process integration. {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 Electromagnic Compatibility. 3 Credits.
Principles and methods concerning electronic system designs that are not sources of or susceptible to electromagnetic interference. 3 lectures. Laboratory. F/2 {Also offered for undergraduate credit - see ECE 455.}.

ECE 661. Control Systems I. 4 Credits.
Modeling and control of dynamic systems, including root-locus, Bode plots, and Nichols charts. 3 lectures, 1 two-hour laboratory. {Also offered for undergraduate credit - see ECE 461.}.

ECE 663. Modern Control. 3 Credits.
Analysis and design of controllers for linear and non-linear systems using state-space methods. Design to specifications, controllability, observability, stability, optimization and state-estimation. 3 lectures. {Also offered for undergraduate credit - see ECE 463.}.

ECE 670. Fault Tolerant Digital Design. 3 Credits.
Design and analysis of reliable digital systems through robust information coding, fault avoidance, and fault-tolerance. 3 lectures. {Also offered for undergraduate credit - see ECE 470.}.

ECE 672. Design Automation of VLSI Circuits. 3 Credits.
Electronic design automation algorithms utilized by software tools, which are used for the design automation of VLSI integrated circuits. This course will cover design steps including circuit synthesis, technology mapping, formal verification, floorplanning, placement, and routing. {Also offered for undergraduate credit - see ECE 472.}.

ECE 674. Computer Architecture. 3 Credits.
Processor operations, computer arithmetic, control mechanism, instruction sets, classification schemes, pipelining, parallel processing, hierarchical memory and memory management, I/O methods and interrupts, and interconnection buses. 3 lectures. {Also offered for undergraduate credit - see ECE 474.}.

ECE 675. Advanced Digital Design. 4 Credits.
Master advanced logic design concepts, including the design and testing of synchronous and asynchronous combinational and sequential circuits using state of the art CAD tools. 3 lectures, 1 two-hour laboratory. {Also offered for undergraduate credit - see ECE 475.}.

ECE 676. Advanced Embedded Systems. 4 Credits.
Specification, design, development, and test of modern embedded systems using a high-level programming language. 3 lectures, 1 two-hour laboratory. {Also available for undergraduate credit, See ECE 476.}.

ECE 677. Hardware Design for Machine Learning. 3 Credits.
Hardware-aware neural network (NN) design in NVidia Developer kit with OpenCV python programming. MAC design for NN and alternate neural network implementations using emerging technologies. Advanced topics in Hardware-aware neural network designs such as Binary nets, FFT-based neural nets, In-compute Memory and near-compute memory. 2 lectures, 1 two-hour laboratory. {Also offered for undergraduate credit - See ECE 477.}.

ECE 679. Formal 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. {Also offered for graduate credit - see ECE 479.}.

ECE 683. Instrumentation for Engineers. 3 Credits.
Study of instrumentation including design, fabrication, and application. F {Also offered for undergraduate credit - see ECE 483.}.

ECE 685. Biomedical Engineering. 3 Credits.
Unified study of engineering techniques and basic principles in physiological systems. Focus on membrane biophysics, biological modeling, compartmental analysis, and systems control theory. F {Also offered for undergraduate credit - see ECE 485.}.

ECE 686. Biosensing Technology. 3 Credits.
Biosensors are defined as analytical devices incorporating a biological material, a biologically derived material or a biomimic associated with or integrated within a physicochemical transducer or transducing microsystem, which may be optical, electrochemical, thermometric, piezoelectric, magnetic or micromechanical. This course provides instruction in the basic science and engineering concepts required to understand the design and application of biosensors. This module serves as an introduction to some of the biosensors and measurement techniques. Prereq: Graduate standing. {Also available for undergraduate credit - see ECE 486.}.

ECE 687. Cardiovascular Engineering. 3 Credits.
This course includes the application of engineering techniques to cardiovascular physiology and medicine. Basic cardiac and vascular physiology will be presented, modeling techniques will be examined. Instrumentation, measurement theory, and assist devices will be discussed. S {Also offered for undergraduate credit - see ECE 487.}.

ECE 688. Cardiovascular Engineering II. 3 Credits.
Analysis, design, and research methods related to modeling and simulating the cardiovascular system. Prereq: ECE 687. {Also offered for undergraduate credit - see ECE 488.}.

ECE 690. Graduate Seminar. 1-3 Credits.

ECE 695. Field Experience. 1-15 Credits.

ECE 696. Special Topics. 1-5 Credits.

ECE 701. Advanaced Engineering Problem Solving. 3 Credits.
Application of advanced mathematical and computational methods to engineering problems. 3 lectures. S.

ECE 702. Advanced Research Topics. 1 Credit.
Prepare the student in finding a major adviser; defining the research questions or objectives; beginning a literature search; learning how to prepare a manuscript and/or grant application with their major adviser. F.

ECE 703. Advanced Teaching and Classroom Topics. 1 Credit.
To help prepare the Ph.D. student for the challenge of teaching in a classroom. F.

ECE 705. Stochastic Processes. 3 Credits.
Random variables, probability bounds, random vectors, random sequences, stochastic processes, and statistical signal processing.

ECE 713. Introduction to Lab-on-a-Chip Technology. 3 Credits.
This course introduces the fundamentals of Lab-on-a-chip technology. It also provides a comprehensive picture of instruments, tools and techniques used in various aspects of Lab-on-a-chip technology. Finally, some applications in biomedical engineering will be discussed.

ECE 721. Integrated Circuits. 3 Credits.
Introduction to CMOS circuits. Circuit characterization and performance estimation. CMOS circuit and logic design, CMOS testing. CMOS subsystem design. 3 lectures. Prereq: ECE 623.

ECE 722. Wireless IC Design. 3 Credits.
Basic concepts of wireless IC design. Various radio transceiver architectures and its application. Design of CMOS radio transceiver circuit blocks. Hands-on-experience on IC design and layout using industry-based chip design software Cadence. Prereq: ECE 621.

ECE 723. Advanced Electronics. 3 Credits.
Characteristics and detailed modeling of operational amplifiers. Applications to waveform generation, analog multiplication, modulation, and data conversion. IC and special amplifiers. 3 lectures. Prereq: ECE 621. (alternate years).

ECE 726. Advanced VLSI Design. 3 Credits.
This course covers state-of-the-art design techniques for VLSI at device, circuit, architecture, and application levels. Prereq: ECE 423 or ECE 623.

ECE 731. Power System Protection. 3 Credits.
Power system protective relaying. Generator, transformer, line, bus, motor protection. 3 lectures. Coreq: ECE 633. S.

ECE 733. Power Distribution. 3 Credits.
Power distribution systems. Lines and transformers, characteristics of loads, voltage drops and corrective measures, lightning protection. Fault analysis, fuses, reclosers, sectionalizers. Power system harmonics and power quality. 3 lectures. Coreq: ECE 631. F.

ECE 734. Modeling and Control of High Voltage Direct Current (HVDC) Systems. 3 Credits.
The course covers fundamentals of modeling, analysis and control of LCC and VSC HVDC systems. Applications integrating renewable energy will also be studied. Prereq: ECE 631.

ECE 737. Advanced Power Electronics. 3 Credits.
The course teaches the characteristics and detailed design of power semiconductors, power conversion topologies and controls, passive component design and selection, and advanced control strategies for DC-DC converters and DC-AC Inverters. 3 lectures Prereq: ECE 637.

ECE 741. Signal Processing I. 3 Credits.
Analysis and design of discrete- and continuous time signals and systems. Advanced treatment of transform techniques and Fourier analysis. Classical filter design techniques. Fast Fourier transform algorithms and applications. 3 lectures. Prereq: ECE 643.

ECE 743. Signal Processing II. 3 Credits.
Discrete-time Wiener and Kalman filtering. Least squares signal processing and filter design. Spectral analysis. Adaptive signal processing. 3 lectures. Prereq: ECE 741. S.

ECE 745. Statistical Communications. 3 Credits.
Advanced topics in communications theory including detection theory, estimation theory, and information theory. 3 lectures. Prereq: ECE 643. S.

ECE 748. Elements of Information Theory. 3 Credits.
This course will cover: entropy, asymptotic equipartition property, data compression, channel capacity, differential entropy, the Gaussian channel, an introduction to rate distortion theory and network information theory.

ECE 749. Wireless Communication. 3 Credits.
Wireless channel model, design of transmission and reception techniques for wireless communication systems and their performance analysis.

ECE 751. Electromagnetic Theory and Applictions. 3 Credits.
Theory of radiation, antenna characteristics, complex waves, potential functions and spectral domain methods for wave guides and cavities, and dispersive media. 3 lectures. S/2.

ECE 755. Advanced Topics in Electromagnetics. 3 Credits.
Topics of current interest in electromagnetics, microwaves, and optics. 3 lectures. Prereq: ECE 751. S/2.

ECE 761. Advanced Control Theory I. 3 Credits.
State variable formulation of the control problem; system identification. Introduction to adaptive, distributed, multivariable, nonlinear, optimal, and stochastic control.

ECE 763. Advanced Control Theory II. 3 Credits.
State variable formulation of the control problem; system identification. Introduction to adaptive, distributed, multivariable, nonlinear, optimal, and stochastic control. Prereq: ECE 761.

ECE 772. Low Power Circuit and System Design. 3 Credits.
This course will cover state-of-the-art design techniques for low power digital circuits and systems at device, circuit, architecture, system, and application levels.

ECE 775. Hardware For Cryptography. 3 Credits.
This course covers the mathematical background, modern cryptographic techniques like block ciphers, hash functions and public-key cryptosystems. Hardware and embedded implementations of cryptosystems and recent research in hardward 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 787. Advanced Cardiovascular Engineering III. 3 Credits.
Advanced research topics in multi-scale cardiac modeling such as vetriculo-arterial coupling, organ-level characterization, tissue characterization, cellular properties, and sub-cellular processes culminating in a grant proposal. Prereq: ECE 687 and ECE 688.

ECE 788. Advanced Cardiovascular Engineering IV. 3 Credits.
Advanced research topics in multi-scale cardiac modeling such as ventriculo-arterial coupling, organ-level characterization, tissue characterization, cellular properties, and sub-cellular processes culminating in a research journal manuscript or conference proceeding. Prereq: ECE 787.

ECE 790. Graduate Seminar. 1-3 Credits.

ECE 791. Temporary/Trial Topics. 1-5 Credits.

ECE 793. Individual Study/Tutorial. 1-5 Credits.

ECE 795. Field Experience. 1-15 Credits.

ECE 796. Special Topics. 1-5 Credits.

ECE 797. Master's Paper. 1-3 Credits.

ECE 798. Master's Thesis. 1-10 Credits.

ECE 801. Big Data and Cloud Computing. 3 Credits.
The course will focus on the state-of-the-art cloud infrastructure with primary emphasis on manipulating, storing, and analyzing big data. Prereq: ECE 776.

ECE 802. High Performance Computing in the Cloud. 3 Credits.
The course will focus on a compelling vision of seamless scaling of computational resources in the cloud computing paradigm to achieve high performance. Prereq: ECE 776.

ECE 892. Graduate Teaching Experience. 1-6 Credits.

ECE 893. Individual Study. 1-5 Credits.

ECE 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

ECE 899. Doctoral Dissertation. 1-15 Credits.

Electrical Engineering (EE)

EE 206. Circuit Analysis I. 4 Credits.
Linear electric circuits. Component models, circuit laws, transient analysis, design issues, computer tools. 3 lectures, 1 two-hour recitation/laboratory. Prereq: MATH 166 with a grade of C or better. Co-req: MATH 129.

Emergency Management (EMGT)

Engineering General (ENGR)

ENGR 111. Introduction to Engineering. 1 Credit.
Designed to provide general engineering students with an opportunity to review, study, discuss, and evaluate various engineering professions as career choices. F, S.

ENGR 191. Seminar. 1-5 Credits.

ENGR 194. Individual Study. 1-3 Credits.

ENGR 196. Field Experience. 1-15 Credits.

ENGR 199. Special Topics. 1-5 Credits.

ENGR 291. Seminar. 1-3 Credits.

ENGR 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENGR 294. Individual Study. 1-5 Credits.

ENGR 299. Special Topics. 1-5 Credits.

ENGR 311. History of Technology. 3 Credits.
This course examines how technology and new technological innovations have played a fundamental role in the development of modern modes of transportation, communication, health, economics, and government, thereby shaping global history. Cross-listed with HIST 311.

ENGR 321. Introduction to Robotics. 3 Credits.
This course equips students with basic principles of Robotics. Students learn the basic engineering elements that are involved in building robots, and applications of robots in the engineering practice.

ENGR 327. Ethics, Engineering, and Technology. 3 Credits.
Students will learn a unique and systematic approach to deal with the ethical issues that are increasingly inherent in technology and engineering practice. Using human morality, this course will examine the emergence of advanced technological systems and how they affect our individual and social behaviors, and in return, how they are affected by those behaviors and our shared and individual morality. Students will examine a broad range of ethical topics in design, sustainability and emerging technologies, professional codes of ethics and case studies. Cross-listed with PHIL 327.

ENGR 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ENGR 391. Seminar. 1-3 Credits.

ENGR 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENGR 394. Individual Study. 1-3 Credits.

ENGR 397. Fe/Coop Ed/Internship. 1-4 Credits.

ENGR 399. Special Topics. 1-5 Credits.

ENGR 402. Engineering Ethics and Social Responsibility. 1 Credit.
Philosophical basis for ethical decisions, guidance for ethical decision making in engineering practice, ethics of social responsibility, professionalism, case studies, and codes of conduct for engineers. Prereq: junior or senior standing.

ENGR 410. Entrepreneurship for Engineers and Scientists. 3 Credits.
This course will provide students real-world, hands-on learning experiences on how to successfully transfer knowledge into products and processes that benefit society. Developing a business model canvas, assessing technology readiness, conducting patent searches, securing intellectual property rights, etc. are covered. Prereq or Coreq: Junior Standing. Dual-listing: ENGR 610.

ENGR 481. Engineering Entrepreneurship Capstone I. 3 Credits.
Integration of engineering and entrepreneurship topics in capstone projects. Students will develop a new business starting from the identification of needs all the way through to the initial minimum viable product build. Prereq: ENGR 310, senior standing, and major departmental approval.

ENGR 482. Engineering Entrepreneurship Capstone II. 3 Credits.
Integration of engineering and entrepreneurship topics in capstone projects. Students will develop a new business starting from the identification of needs all the way through to the initial minimum viable product build. Prereq: ENGR 310, senior standing, and major departmental approval.

ENGR 491. Seminar. 1-5 Credits.

ENGR 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENGR 493. Undergraduate Research. 1-5 Credits.

ENGR 494. Individual Study. 1-5 Credits.

ENGR 496. Field Experience. 1-15 Credits.

ENGR 499. Special Topics. 1-5 Credits.

ENGR 610. Entrepreneurship for Engineers and Scientists. 3 Credits.
This course will provide students real-world, hands-on learning experiences on how to successfully transfer knowledge into products and processes that benefit society. Developing a business model canvas, assessing technology readiness, conducting patent searches, securing intellectual property rights, etc. are covered. Dual-listing: ENGR 410.

ENGR 690. Graduate Seminar. 1-5 Credits.

ENGR 696. Special Topics. 1-5 Credits.

ENGR 722. Academic Writing in the Engineering Disciplines. 3 Credits.
Students will learn to effectively use structural elements of academic writing by analyzing published papers. They will also work on sentence-level clarity and draft their own papers for publication. Restrictions: Enrollment is limited to graduate students in the College of Engineering or graduate students whose advisers are faculty members in the College of Engineering.

ENGR 770. Quantitative Modeling. 3 Credits.
Applications modeling and optimization methods. Domains: transportation, logistics, manufacturing, service systems scheduling, and supply-chain management. Decision models: linear programming and sensitivity analysis, transportation and assignment, network models and algorithms, and integer, dynamic and nonlinear programming. Cross-listed with IME 770.

ENGR 771. Probabilistic and Deterministic Methods. 3 Credits.
Applications modeling. Domains include transportation, logistics, manufacturing, service systems scheduling, and supply-chain management. Quantitative models and tools include Markov chains, stochastic processes, queuing, deterministic and stochastic decision analysis, time series, forecasting, and regression modeling. Prereq: IME 660. Cross-listed with IME 771.

ENGR 790. Seminar. 1-5 Credits.

ENGR 791. Temporary/Trial Topics. 1-5 Credits.

ENGR 793. Individual Study/Tutorial. 1-5 Credits.

ENGR 899. Doctoral Dissertation. 1-15 Credits.

English (ENGL)

ENGL 110. College Composition I. 3 Credits.
Guided practice in the reading and writing of various genres for different situations and audiences. Includes research on the web and in the library. Prereq: English placement.

ENGL 112. Multilingual College Composition I. 3 Credits.
Guided practice in college-level reading, writing, and critical thinking. Includes process writing, genres and an introduction to library research. Reserved for international or multilingual students. Equivalent to ENGL 110. Prereq: English placement.

ENGL 120. College Composition II. 3 Credits.
Advanced practice in reading and writing of various genres for different situations and audiences. Includes field research, collaboration, and visual communication. Prereq: ENGL 110 or placement.

ENGL 121. Honors Composition II. 3 Credits.
Accelerated practice in college-level writing for qualified students with skills in research and argumentation. Essays using library research and summaries, paraphrases, and quotations from relevant sources. Requires enrollment in the Scholars Program. Equivalent to ENGL 120. Prereq: ENGL 111.

ENGL 122. Multilingual College Composition II. 3 Credits.
Advanced practice in reading and writing of various genres for different situations and audiences. Includes field research, collaboration, and visual communication. Reserved for international or multilingual students. Equivalent to ENGL 120. Prereq: ENGL 110 or ENGL 112 or English placement.

ENGL 150. Being Human. 3 Credits.
Explore diverse cultures and contexts through fiction, non-fiction, visual, or other texts.

ENGL 167. Introduction to English Studies. 3 Credits.
An introduction to the different areas of English studies including literature, writing studies, and linguistics and the ways in which they are studied.

ENGL 194. Individual Study. 1-3 Credits.

ENGL 196. Field Experience. 1-15 Credits.

ENGL 199. Special Topics. 1-5 Credits.

ENGL 209. Introduction to Linguistics. 3 Credits.
Entry-level knowledge for the scientific study of language, including such topics as phonetics, phonology, morphology, semantics, grammar, social and cultural dimensions, acquisition, variation and similarities among languages of the world, and related cultural history. Cross-listed with ANTH 209.

ENGL 220. Introduction to Literature. 3 Credits.
Reading and discussion of representative examples of poetry, drama, and fiction, with emphasis on the use of common literary terminology. Classic and contemporary works. Focus on enjoyment and appreciation of verbal art.

ENGL 222. Introduction to Poetry. 3 Credits.
Examination of poetic forms including the uses of figurative language and the techniques of rhythm and meter, as well as imagery and structure. Includes traditional and contemporary lyrics. Prereq: ENGL 120.

ENGL 225. Introduction to Film. 3 Credits.
General introduction to film studies, including analysis of narrative and stylistic elements of films for their artistic merits and their reflection of an influence on society.

ENGL 229. Introduction to Creative Writing. 3 Credits.
Introduction to the craft of creative writing with an emphasis on exploring multiple genres and developing a strong cultural awareness through readings and discussion.

ENGL 240. World Literature Masterpieces. 3 Credits.
Study of representative cultural and literary materials from the ancient world to modern times. Prereq or Coreq: ENGL 120.

ENGL 251. British Literature I. 3 Credits.
Survey of major works and writers in British literature from the Anglo-Saxon period through the 18th century. Prereq: ENGL 120.

ENGL 252. British Literature II. 3 Credits.
Survey of major works and writers in British literature from the Romantic Age to the present. Prereq: ENGL 120.

ENGL 261. American Literature I. 3 Credits.
Survey of significant works and writers in American literature from Native American literature through the Civil War. Emphasis on the multicultural development of American literary expressions. Prereq: ENGL 120.

ENGL 262. American Literature II. 3 Credits.
Survey of significant works and writers in American literature from the Civil War to the present. Includes traditional as well as experimental, innovative, and counter-cultural works and authors. Prereq: ENGL 120.

ENGL 272. Literary Analysis. 3 Credits.
Introduction to traditional and contemporary literary and critical theory and to the fundamental skills required for the analysis of literary or other texts. Prereq: ENGL 120.

ENGL 275. Introduction to Writing Studies. 3 Credits.
A broad history of writing and rhetoric as well as an introduction to spheres of writing studies: creative, academic, professional/technical, and public writing. Prereq: ENGL 120.

ENGL 291. Seminar. 1-3 Credits.

ENGL 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENGL 294. Individual Study. 1-5 Credits.

ENGL 299. Special Topics. 1-5 Credits.

ENGL 301. Peer Tutoring and Writing in the Disciplines. 3 Credits.
Introduction to individual writing instruction and conventions of disciplinary writing. In addition to classroom work and assignments, students will complete a practicum in the Center for Writers. Recommended for prospective educators, writing specialists in all fields, and peer tutors in the Center for Writers. Prereq: ENGL 120.

ENGL 313. Literary Publications. 3 Credits.
Theory and practice in the process of producing a literary magazine. Prereq: ENGL 120.

ENGL 320. Business and Professional Writing. 3 Credits.
Intensive practice employing the conventions of writing needed in professional genres and settings: writing for specific audiences and purposes. Inform, analyze, evaluate, and persuade. Prereq: ENGL 120, Junior standing.

ENGL 321. Writing in the Technical Professions. 3 Credits.
Intensive practice employing the conventions of professional genres to write about technology development and use for expert, business, and more general audiences. Prereq: ENGL 120, Junior standing.

ENGL 322. Writing and the Creative Process. 3 Credits.
Exploring genres that fuel creativity and critical awareness. Emphasis on flexibility and inventiveness in realizing any personal or professional project. Products may range from poetry/fiction to blogs to student-designed assignments based on major. Prereq: ENGL 120, Junior standing.

ENGL 323. Creative Writing. 3 Credits.
Creative writing with a focus on one literary genre. May be repeated for credit. Prereq: ENGL 120.

ENGL 324. Writing in the Sciences. 3 Credits.
The study and practice in written conventions of the sciences for academic, scientific, and public audiences. Prereq: ENGL 120, Junior standing.

ENGL 325. Writing in the Health Professions. 3 Credits.
Study of and practice in language use and written conventions of the health professions for academic, scientific, and public audiences. Prereq: ENGL 120 and Junior standing.

ENGL 326. Writing in the Design Professions. 3 Credits.
This course provides intensive practice employing the conventions of those professional genres needed to write for professional contexts and audiences in design fields. Prereq: ENGL 120, Junior standing.

ENGL 330. Women's Writing. 3 Credits.
Study of writing (and other texts) produced by women of various cultural, ethnic, or national backgrounds from a variety of time periods. May be repeated for credit. Prereq: ENGL 120.

ENGL 333. Fantasy and Science Fiction. 3 Credits.
Study of social and psychological implications of fantasy literature and works of fiction concerned with the impact of science and technology on the human imagination. Prereq: ENGL 120.

ENGL 335. Multicultural Writers. 3 Credits.
Major literary figures within and outside the United States. Includes Asian, Mexican, and Canadian, as well as Native-American, Black, Asian-American, and Chicano writers. Prereq: ENGL 120.

ENGL 336. Literature and The Environment. 3 Credits.
The study of literature and culture from an ecological or environmental perspective, with an emphasis on how diverse authors treat the subject of nature. Reading and analysis of literary encounters with place and issues that arise when the local is global. Prereq: ENGL 120.

ENGL 340. 19th Century American Fiction. 3 Credits.
Selected fiction reflecting problems and ideas, emphasizing the shift from romanticism to realism and naturalism, of the 19th century. Representative writers: Cooper, Hawthorne, Twain, Jewett, James, and Wharton, and includes minority voices. Prereq: ENGL 120.

ENGL 341. Contemporary American Fiction. 3 Credits.
Explores selected fiction reflecting social, psychological and literary trends in the 20th and 21st centuries. Includes discussion of multicultural and women authors, as well as experimentations in genre. Prereq: ENGL 120.

ENGL 345. Themes in American Culture. 3 Credits.
A multidisciplinary approach, including art, music, and literature, to various eras and themes in American cultural history. Prereq: ENGL 120.

ENGL 357. Visual Culture and Language. 3 Credits.
This course will cover the rise of visual culture and the impact this historical shift has made on print culture and writing. Students will produce information graphics, photo essays, videos, and other genres. Prereq: ENGL 120, Junior standing.

ENGL 358. Writing in the Humanities and Social Sciences. 3 Credits.
Theory and practice for writing multiple genres in the humanities and social sciences. Prereq: ENGL 120, Junior standing.

ENGL 360. Grammatical Structure/English. 3 Credits.
Examines the system of the English sentence. Emphasis on structures and components with attention to application in teaching, stylistic analysis, and editing.

ENGL 375. The Bible as Literature. 3 Credits.
Study of the texts of the Hebrew Bible and New Testament, with an emphasis on the documents' historical and cultural settings, their global influence, and current rhetorical and literary interpretative methods. Prereq: ENGL 120.

ENGL 376. Poetry of Rock. 3 Credits.
Examination of rock lyrics as contemporary poems, using techniques of literary criticism to analyze their themes, their aesthetic principles, and their place in art and culture.

ENGL 377. Modern Poetry. 3 Credits.
Experimentation and innovation in poetry from 1910 to 1945. American, English, and Irish poets, including such transnational writers as Eliot, Pound, H.D., D.H. Lawrence, and Auden. May be repeated. Prereq: ENGL 120.

ENGL 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ENGL 380. Shakespeare. 3 Credits.
Study of representative poetry, comedies, histories, and tragedies. Prereq: ENGL 120.

ENGL 382. Film Genres and Styles. 3 Credits.
Study of one or more film genres, styles, or movements, focusing on aesthetic conventions, cultural context, socio-historical significance, and critical approaches. May be repeated with change of topic. Prereq: THEA 115 or ENGL 225 or ENGL 272.

ENGL 385. British Fiction. 3 Credits.
Examines significant works of British and their literary artistry.short and long fiction in terms of their cultural, social, and psychological content. Prereq: ENGL 120.

ENGL 389. Non-fiction Prose. 3 Credits.
Examines non-fiction prose in its various forms as a significant literary genre capable of exploring cultural, social, historical, psychological, and philosophical matters with logic, emotional power, and literary artistry. Prereq: ENGL 120.

ENGL 391. Seminar. 1-3 Credits.

ENGL 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENGL 394. Individual Study. 1-5 Credits.

ENGL 396. Field Experience. 1-15 Credits.
Field Experience.

ENGL 399. Special Topics. 1-5 Credits.

ENGL 423. Creative Writing Studio. 3 Credits.
Advanced creative writing with an emphasis on the student as working writer. Readings in creative and/or critical texts and participation in community events. Intensive workshop discussion, with the goal of producing a publishable manuscript. Prereq: ENGL 275, ENGL 322 or ENGL 323.

ENGL 435. Young Adult Literature in a Multicultural World. 3 Credits.
Introduction to the field of Young Adult Literature (YAL) with an emphasis on multicultural novels. Recommended for English Education majors, English majors seeking breadth in their reading, and students seeking diverse reading. Prereq: ENGL 120. {Also offered for graduate credit - see ENGL 635.}.

ENGL 449. Usability and User Experience. 3 Credits.
This course focuses on principles that drive strong user-centered design. Additionally, it will prepare students to collaborate with design teams to create better documentation, to create fuller user understandings of user inscription preferences, and to craft information strategies. This course will teach user inquiry methods, data collection, genre conventions, and rhetorical strategies for user advocacy. {Also offered for graduate credit - see ENGL 649.}.

ENGL 452. History of the English Language. 3 Credits.
Development of the English language from its Germanic origins to the modern period. Prereq: ENGL 120. Recommended: ENGL 209. {Also offered for graduate credit - see ENGL 652.}.

ENGL 453. Social and Regional Varieties of English. 3 Credits.
Study of sociological factors as they relate to language (American English). Examines region, age, gender, ethnicity, self-identity, situation, profession, etc. and their relation to pronunciation, word choice, politeness, formality, turn-taking, etc. Students conduct original research. Prereq: ENGL 120. Recommended: ENGL 209. {Also offered for graduate credit - see ENGL 653.}.

ENGL 454. Language Bias. 3 Credits.
Application of current linguistic, rhetorical, and literary theory to examine and analyze the ways in which the social asymmetries of gender, sexuality, race, and ethnicity are reflected and sustained through discourse practices. Prereq: ENGL 120. {Also offered for graduate credit - see ENGL 654.}.

ENGL 455. International Technical Writing. 3 Credits.
Theories and practical applications of approaches to international technical documents, including globalization, localization, and translation preparations and procedures. Extensive use of case studies and cultural models. Prereq: ENGL 120, Junior standing. {Also offered for graduate credit - see ENGL 655.}.

ENGL 456. Literacy, Culture and Identity. 3 Credits.
Reading, writing, research, and discussion of diverse types of literacy from functional to cultural to technological and their roles in culture and identity formation. Completion of related community projects. Prereq: ENGL 272 or ENGL 275, Junior standing. {Also offered for graduate credit - see ENGL 656.}.

ENGL 457. Electronic Communication. 3 Credits.
This web-based class will explore issues related to electronic communication through selected readings, projects that allow students to develop skills and insight through experiential learning, and though reflection on the dynamics of online education itself. Prereq: ENGL 120.

ENGL 458. Advanced Writing Workshop. 3 Credits.
Writing, revising, and editing projects based on rhetorical principles. Frequent response from peers and instructor. Analysis of selected readings and students' own writing. Prereq: Any one of the following: ENGL 320, ENGL 321, ENGL 322, ENGL 323, ENGL 324, ENGL 325, ENGL 326 or ENGL 358.

ENGL 459. Researching and Writing Grants and Proposal. 3 Credits.
A rhetorical approach to researching and writing academic grants, business proposals, and related professional documents. Students develop a portfolio of professionally designed and edited documents as well as the vocabulary of grants writing and research. Prereq: ENGL 120 and Junior standing. {Also offered for graduate credit - see ENGL 659.}.

ENGL 467. English Studies Capstone Experience. 3 Credits.
Cumulative and integrative study for English majors of English language, literature, and composition. Prereq: ENGL 272.

ENGL 472. 20th Century American Writers. 3 Credits.
Intensive study of major American writers from 1900 to 1950. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 672.}.

ENGL 474. Native American Literature. 3 Credits.
The development of literature by and about Native Americans is traced from 1850 to the present. Focus on Native American identity and contributions to the American culture. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 674.}.

ENGL 476. Topics in American Literature. 3 Credits.
Intensive study of a special theme, form, period, or group of writers central to the formation and development of American literature. May be repeated with change of topic. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 676.}.

ENGL 480. Medieval Literature. 3 Credits.
British poetry and prose from the beginning of the Middle Ages to 1500, excluding Chaucer. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 680.}.

ENGL 482. Renaissance Literature. 3 Credits.
Study of British writers of the 16th and 17th centuries. Prereq: ENGL 272. {Also offered for undergraduate credit - see ENGL 682.}.

ENGL 483. Topics in British Literature. 3 Credits.
Intensive study of a special theme, form, period, or group of writers central to the formation of British literature. May be repeated with change of topic. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 683.}.

ENGL 486. Romantic Literature. 3 Credits.
Study of major British writers from the French Revolution to the coronation of Queen Victoria. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 686.}.

ENGL 491. Seminar. 1-5 Credits.

ENGL 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENGL 493. Undergraduate Research. 1-5 Credits.

ENGL 494. Individual Study. 1-5 Credits.

ENGL 496. Field Experience. 1-15 Credits.

ENGL 499. Special Topics. 1-5 Credits.

ENGL 635. Young Adult Literature in a Multicultural World. 3 Credits.
Introduction to the field of Young Adult Literature (YAL) with an emphasis on multicultural novels. Recommended for English Education majors, English majors seeking breadth in their reading, and students seeking diverse reading. {Also offered for undergraduate credit - see ENGL 435.}.

ENGL 649. Usability and User Experience. 3 Credits.
This course focuses on principles that drive strong user-centered design. Additionally, it will prepare students to collaborate with design teams to create better documentation, to create fuller user understandings of user inscription preferences, and to craft information strategies. This course will teach user inquiry methods, data collection, genre conventions, and rhetorical strategies for user advocacy. {Also offered for undergraduate credit - see ENGL 449.}.

ENGL 652. History of the English Language. 3 Credits.
Development of the English language from its Germanic origins to the modern period. {Also offered for undergraduate credit - see ENGL 452.}.

ENGL 653. Social and Regional Varieties of English. 3 Credits.
Study of sociological factors as they relate to language (American English). Examines region, age, gender, ethnicity, self-identity, situation, profession, etc. and their relation to pronunciation, word choice, politeness, formality, turn-taking, etc. Students conduct original research. {Also offered for undergraduate credit - see ENGL 453.}.

ENGL 654. Language Bias. 3 Credits.
Application of current linguistic, rhetorical, and literary theory to examine and analyze the ways in which the social asymmetries of gender, sexuality, race, and ethnicity are reflected and sustained through discourse practices. {Also offered for undergraduate credit - see ENGL 454.}.

ENGL 655. International Technical Writing. 3 Credits.
Theories and practical applications of approaches to international technical documents, including globalization, localization, and translation preparations and procedures. Extensive use of case studies and cultural models. {Also offered for undergraduate credit - see ENGL 455.}.

ENGL 656. Literacy, Culture and Identity. 3 Credits.
Reading, writing, research, and discussion of diverse types of literacy from functional to cultural to technological and their roles in culture and identity formation. Completion of related community projects. {Also offered for undergraduate credit - see ENGL 456.}.

ENGL 659. Researching and Writing Grants and Proposal. 3 Credits.
A rhetorical approach to researching and writing academic grants, business proposals, and related professional documents. Students develop a portfolio of professionally designed and edited documents as well as the vocabulary of grants writing and research. {Also offered for undergraduate credit - see ENGL 459.}.

ENGL 672. 20th Century American Writers. 3 Credits.
Intensive study of major American writers from 1900 to 1950. {Also offered for undergraduate credit - see ENGL 472.}.

ENGL 674. Native American Literature. 3 Credits.
The development of literature by and about Native Americans is traced from 1850 to the present. Focus on Native American identity and contributions to the American culture. {Also offered for undergraduate credit - see ENGL 474.}.

ENGL 676. Topics in American Literature. 3 Credits.
Intensive study of a special theme, form, period, or group of writers central to the formation and development of American literature. May be repeated with change of topic. {Also offered for undergraduate credit - see ENGL 476.}.

ENGL 680. Medieval Literature. 3 Credits.
British poetry and prose from the beginning of the Middle Ages to 1500, excluding Chaucer. {Also offered for undergraduate credit - see ENGL 480.}.

ENGL 682. Renaissance Literature. 3 Credits.
Study of British writers of the 16th and 17th centuries. {Also offered for undergraduate credit - see ENGL 482.}.

ENGL 683. Topics in British Literature. 3 Credits.
Intensive study of a special theme, form, period, or group of writers central to the formation of British literature. May be repeated with change of topic. {Also offered for undergraduate credit - see ENGL 483.}.

ENGL 686. Romantic Literature. 3 Credits.
Study of major British writers from the French Revolution to the coronation of Queen Victoria. {Also offered for undergraduate credit - see ENGL 486.}.

ENGL 690. Graduate Seminar. 1-3 Credits.

ENGL 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENGL 695. Field Experience. 1-15 Credits.
Field-oriented supervised learning activities outside the college classroom that include a preplanned assessment of the experience, registration during the term the experience is conducted, and post evaluation with the instructor. Departmental approval.

ENGL 696. Special Topics. 1-5 Credits.

ENGL 751. Tools for Academic Writing: Clarity and Style. 1 Credit.
Primary goal: Students will learn and practice using specific strategies for writing clear, correct, and audience-appropriate academic documents. In addition, they will investigate writing expectations and analyze academic writing in their own discipline. S/U grading.

ENGL 752. Tools for Academic Writing: Writing Your Manuscript. 1 Credit.
Semester-long intensive academic writing with extensive individualized feedback. Students develop a writing plan, obtain approval from their advisors, and write intensively, receiving regular individualized assistance from a graduate writing consultant. S/U grading.

ENGL 753. Rhetorics, Poetics Of New Media. 3 Credits.
This web-based class will provide in-depth study of major new media theorists and require students to consider the research and teaching implications of new media for the humanities and social sciences. . Prereq: Graduate standing.

ENGL 754. Rhetorics of Science, Technology, and Medicine. 3 Credits.
The study of the rhetorics of science, technology, and medicine, including how both specialists and nonspecialists use language to advance arguments about these fields with public and social impacts.

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. Teaching Workshop for Writing Instructors. 3 Credits.
Introduction to current issues in composition pedagogy, research, and theory, focusing on how they inform teaching practices. Structured support and development in the teaching of first-year writing.

ENGL 765. Upper Division Writing: Pedagogy, Practice, and Technology. 3 Credits.
Theory, practice, and pedagogy for teaching upper-division writing classes. Discussion will include a number of writing studies topics, including Writing across Curriculum (WAC), Writing in the Disciplines (WID), and writing program administration. Prereq: ENGL 764.

ENGL 766. Teaching Literature. 3 Credits.
Theory, practice, and pedagogy for teaching literature at the college and/or university level. This course focuses on literary genres, cultures, and theories in the context of pedagogy. Prereq: ENGL 764 or ENGL 765. Recommended prereq: ENGL 762.

ENGL 770. Studies in American Literature. 3 Credits.
Intensive study of a special period, theme, technique, or group of writers central to the formation, development, or flowering of American literature. May be repeated for credit with change in topic.

ENGL 780. Studies in British Literature. 3 Credits.
Intensive study of a special period, theme, technique, or group of writers central to the formation, development, or flowering of British literature. May be repeated with change of topic.

ENGL 790. Graduate Seminar. 1-3 Credits.

ENGL 791. Temporary/Trial Topics. 1-5 Credits.

ENGL 792. Graduate Teaching Experience. 1-6 Credits.

ENGL 793. Individual Study/Tutorial. 1-5 Credits.

ENGL 794. Practicum. 1-8 Credits.

ENGL 795. Field Experience. 1-15 Credits.

ENGL 796. Special Topics. 1-5 Credits.

ENGL 797. Master's Paper. 1-3 Credits.

ENGL 798. Master's Thesis. 1-10 Credits.

ENGL 892. Graduate Teaching Experience. 1-6 Credits.

ENGL 893. Individual Study/Tutorial. 1-5 Credits.

ENGL 894. Practicum/Internship. 1-8 Credits.

ENGL 895. Field Experience. 1-15 Credits.

ENGL 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

ENGL 899. Doctoral Dissertation. 1-15 Credits.

Entomology (ENT)

ENT 194. Individual Study. 1-3 Credits.

ENT 196. Field Experience. 1-15 Credits.

ENT 199. Special Topics. 1-5 Credits.

ENT 210. Insects, Humans and the Environment. 3 Credits.
Insect biology and its relevance to humans and the environment. 2 lectures.

ENT 291. Seminar. 1-3 Credits.

ENT 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENT 294. Individual Study. 1-5 Credits.

ENT 299. Special Topics. 1-5 Credits.

ENT 350. General Entomology. 3 Credits.
Fundamental aspects of Entomology, including: insect classification, identification, structure, biology, adaptations, and impact on human society. 2 lectures, 1 two-hour laboratory. F.

ENT 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ENT 391. Seminar. 1-3 Credits.

ENT 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENT 394. Individual Study. 1-5 Credits.

ENT 399. Special Topics. 1-5 Credits.

ENT 431. Principles of Insect Pest Management. 3 Credits.
This course focuses on integrated pest management of insects and related arthropods. The course will cover information and tactics relevant to using and developing IPM programs (e.g. pesticides, economic thresholds, biocontrol). Prereq: ENT 350. S (odd years) {Also offered for graduate credit - see ENT 631.}.

ENT 470. Insect Ecology. 3 Credits.
This course explores the importance of insects for investigating basic and applied ecological questions. We will primarily use the peer-reviewed literature to look at some of the most important issues in insect ecology. In doing so, we will look at the ecological foundations of these issues, the methods scientists use to research them, and their connections to management. The course will be online and asynchronous with regular deadlines to help maintain progress throughout the semester. Prereq: ENT 350. {Also offered for graduate credit - see ENT 670.}.

ENT 491. Seminar. 1-5 Credits.

ENT 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENT 493. Undergraduate Research. 1-5 Credits.

ENT 494. Individual Study. 1-5 Credits.

ENT 496. Field Experience. 1-15 Credits.

ENT 499. Special Topics. 1-5 Credits.

ENT 631. Principles of Insect Pest Management. 3 Credits.
This course focuses on integrated pest management of insects and related arthropods. The course will cover information and tactics relevant to using and developing IPM programs (e.g. pesticides, economic thresholds, biocontrol). S (odd years) {Also offered for undergraduate credit - see ENT 431.}.

ENT 670. Insect Ecology. 3 Credits.
This course explores the importance of insects for investigating basic and applied ecological questions. We will primarily use the peer-reviewed literature to look at some of the most important issues in insect ecology. In doing so, we will look at the ecological foundations of these issues, the methods scientists use to research them, and their connections to management. The course will be online and asynchronous with regular deadlines to help maintain progress throughout the semester. {Also offered for undergraduate credit - see ENT 470.}.

ENT 690. Graduate Seminar. 1-3 Credits.

ENT 695. Field Experience. 1-15 Credits.

ENT 696. Special Topics. 1-5 Credits.

ENT 741. Insect-Plant Interactions. 3 Credits.
Insect-plant interactions are a key feature of the terrestrial ecology of our planet. The course will cover plant interactions with both herbivores and pollinators, and will emphasize the behavioral mechanisms insects use to exploit plants.

ENT 750. Systematic Entomology. 5 Credits.
Introduction to systematic methods and principles; identification of common families of insects. F (even years).

ENT 751. Immature Insects. 3 Credits.
Characteristics of the immature forms of the orders and principal families of insects. Prereq: ENT 750. F (odd years).

ENT 760. Insect Structure. 4 Credits.
Structure of insects and physiological functions. The development of adult form from embryonic and larval precursors during growth and metamorphosis; evolutionary development of insect structures. F (odd years).

ENT 761. Insect Physiology. 4 Credits.
Function of major insect organ systems and metabolism, growth, and molting of insects. S (odd years).

ENT 770. Writing a Scientific Literature Review. 3 Credits.
Explore how and why to create a scientific literature review in this writing intensive class. Hands-on exercises will help improve scientific writing, peer-review, and self-assessment while working throughout the semester to create your own review.

ENT 790. Graduate Seminar. 1-3 Credits.

ENT 791. Temporary/Trial Topics. 1-5 Credits.

ENT 792. Graduate Teaching Experience. 1-6 Credits.

ENT 793. Individual Study/Tutorial. 1-5 Credits.

ENT 794. Practicum/Internship. 1-15 Credits.

ENT 795. Field Experience. 1-15 Credits.

ENT 796. Special Topics. 1-5 Credits.

ENT 798. Master's Thesis. 1-10 Credits.

ENT 899. Doctoral Dissertation. 1-15 Credits.

Entrepreneurship (ENTR)

ENTR 201. Introduction to Entrepreneurship. 3 Credits.
Business majors and minors, non-business majors, and non-degree seeking students will receive an introduction to the entrepreneurial process, evaluating the market feasibility of new product and business ideas, and launching an entrepreneurial venture. Students will develop an understanding of the business concept and business model. Students will analyze social structures that predict human behaviors and affect consumer decision making, through practical hands-on exercises. Building on researched theories surrounding various ideation methods, such as design thinking, they will apply higher-level problem-solving skills to discover core customer problems and generate original solutions.

ENTR 301. Entrepreneurship Toolbox I. 3 Credits.
The course emphasizes the "soft" skills an entrepreneur will need during the early years of business formation and growth. It will provide students with a series of frameworks, skills and techniques that can be used in growing entrepreneurial businesses. Students will explore ways to shape and evaluate the viability of potential opportunities by understanding key industry factors, market and competitive factors and customer needs. Students will gain a better understanding of personal entrepreneurial capacity, team building and management. The course relies on non-traditional, experiential learning methods and cases to help students learn. Co-req: ENTR 201 or MGMT 470.

ENTR 401. Entrepreneurship Capstone. 3 Credits.
This course is designed to teach people with entrepreneurial aspirations a process for how to take an idea and turn it into a reality. Students will explore ways to shape and evaluate the viability of these opportunities by understanding key industry factors, market and competitive factors and customer needs. This course provides an opportunity for you to work with other students with varied skills and expertise in order to develop an entrepreneurial opportunity. The main purpose of this course is to allow you to work to develop a new business proposal by generating an idea, using business modeling techniques to flesh out that idea and define the venture opportunity, moving through the customer research and development process, and assessing how to improve their new venture concept. Prereq: ENTR 201 or MGMT 470. Co-req: ENTR 301 or ENGR 310 or ENTR 440 or MGMT 472.

ENTR 440. International Entrepreneurship. 3 Credits.
This course teaches how to develop a feasible business model for international or immigrant entrepreneurs. Prereq: ENTR 201 or MGMT 470 and restricted to College of Business major or minor with an accumulative minimum 2.5 GPA.

ENTR 491. Seminar. 1-5 Credits.

ENTR 494. Individual Study. 1-5 Credits.

ENTR 496. Practicum/Internship. 1-15 Credits.

ENTR 695. Field Experience. 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 statues and regulatory programs that governs environmental quality, pollution control and wildlife management, including legislative enactment, regulatory development, enforcement, federal/state relationship and judicial interpretation.

ECS 790. Graduate Seminar. 1-3 Credits.

ECS 797. Master's Paper. 1-5 Credits.

ECS 798. Master's Thesis. 1-10 Credits.

ECS 899. Doctoral Dissertation. 1-15 Credits.

Environmental Design (ENVD)

ENVD 101. Introduction to Environmental Design. 3 Credits.
Introduction to the environmental design fields of city planning, urban design, landscape architecture, architecture, and interior design. Particular attention is given to basic design concepts, visualization, visual analysis, imagination, and creativity.

ENVD 102. Drawing Basics for Environmental Designers. 1 Credit.
Introduction to the conventions of graphic expression as employed in architecture and landscape architecture.

ENVD 104. Environmental Design Fundamentals. 1 Credit.
Introduction to environmental design fundamentals, including the elements and principles of design, visual abstraction, visual literacy relating to environmental design problem-solving, visual resolution of form and proportion, and graphic communication.

ENVD 130. Drawing Skills for Environmental Designers. 3 Credits.
Introduction to the skills of graphic expression as employed in architecture and landscape architecture.

ENVD 172. Environmental Design Fundamentals Studio. 3 Credits.
Introduction to design studio, with practice in representational media, techniques and skills exploring drawing, visual abstraction, visual literacy relating to environmental design problem-solving, visual resolution of form and proportion, and graphic communication.

Environmental Engineering (ENVE)

ENVE 111. Introduction to Environmental Engineering. 1 Credit.
Introduction to the environmental engineering discipline; overview of the design process and pertinent regulations; exposure to professional ethics and licensure; and, development of technical, communication, and presentation skills. One 2 hr. lab per week.

ENVE 112. Analysis and Design Methods for Environmental Engineers. 1 Credit.
Exposure to real-life environmental design, analysis, and processes. This will include an overview of contemporary software, exposure to sustainability, cultural, global, environmental, social, risk, and economic considerations. 1 three-hour lab.

ENVE 240. Microbiological Principles for Environmental Engineers. 3 Credits.
Overview of microbiology for natural and engineered systems; fundamentals of microbiology for water/wastewater treatment and hazardous waste remediation; microbial risk assessment; microbial kinetics. 3 one-hour lectures.

ENVE 250. Fundamentals of Environmental Engineering. 3 Credits.
Fundamental principles in environmental engineering; basic principles of calculation; introduction to mass and energy balances; chemical stoichiometry; biology, microbiology, biochemistry, and enzyme kinetics; risk and uncertainty; and, fundamental concepts for assessing sustainability. 3 one-hour lectures. Prereq: MATH 165.

ENVE 360. Environmental Chemistry for Water and Wastewater. 3 Credits.
Chemical principles applied to surface water quality issues in water supply, wastewater treatment, natural water/pollution. Includes coverage of organic loads, trace metals, organic compounds, nutrients, solids, disinfectants, and dissolved oxygen. 3 one-hour lectures. Co-req: CHEM 240.

ENVE 370. Sustainability Engineering. 3 Credits.
Social, economic, and environmental aspects of sustainable design, including regulations; introduction to life cycle assessment and environmental impacts; overview of GIS and risk assessment; and use of probability and statistics to understand uncertainty. Prereq: ENVE 250.

ENVE 412. Unit Operations and Processes. 2 Credits.
Application of physical and chemical operations and biological processes in environmental engineering. Topics include biokinetics, coagulation/flocculation, absorption, gas stripping, and bench-scale projects. 1 one-hour lecture and 1 three-hour lab. Prereq: CE 309 and ENVE 360 Coreq: CE 410.

ENVE 450. Environmental Engineering Chemistry Laboratory. 1 Credit.
Water chemistry laboratory; technical communication and statistical analyses. 1 three-hour laboratory. Prereq: ENVE 360 and coreq: ENGL 321.

ENVE 460. Environmental Fate and Transport. 3 Credits.
Introduction to the major physical, chemical, and biological processes of pollutant transformation and transport between air, water, and the subsurface. Three, one-hour lectures. Prereq: CE 309 and ENVE 360.

ENVE 468. Plastics Pollution to Solution. 3 Credits.
Detailed understanding of plastics pollution, health and environmental impacts, plastics degradation, micro and nanoplastics fate and transport, challenges with plastics recycling, laws and regulations on plastics waste minimization. Prereq: ENVE 360 or CE 370. {Also offered for graduate credit - see ENVE 668.}.

ENVE 473. Air Pollution. 3 Credits.
Air quality management issues and regulations, sources of air pollutants, meteorology as it applies to air quality, chemistry, and physics of air pollutant transport and transformations, and air pollutant dispersion modeling. Prereq: CE 370 or (ENVE 460 and ENVE 412).

ENVE 488. Senior Design I. 2 Credits.
Application of cumulative knowledge gained during academic career towards the design of environmental systems for the minimization, treatment/disposal, and/or destruction of wastes across all pertinent media. Initial preliminary design incorporate economic, social, environmental, regulatory, sustainable, and risk-based analyses and requirements; along with ethical judgement. Two, 3-hour labs (studio style). Prereq: ENVE 412 and consent of instructor.

ENVE 489. Senior Design II. 2 Credits.
Application of cumulative knowledge gained during the academic career towards the design of environmental systems for the minimization, treatment/disposal, and/or destruction of wastes across all pertinent media. Field, lab, and/or literature work/data collection/experimentation will be undertaken by the design teams to collect data needed for the final design of the project begun during ENVE 488. Final designs will incorporate economic, social, environmental, regulatory, sustainable, life-cycle, and risk-based/uncertainty analyses and requirements; along with ethical judgement. Two, 3-hour labs (studio style). Prereq: ENVE 488.

ENVE 496. Field Experience. 1-15 Credits.

ENVE 668. Plastics Pollution to Solution. 3 Credits.
Detailed understanding of plastics pollution, health and environmental impacts, plastics degradation, micro and nanoplastics fate and transport, challenges with plastics recycling, laws and regulations on plastics waste minimization. {Also offered for undergraduate credit - see ENVE 468.}.

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. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

FIN 330. Data Analytics in Finance. 3 Credits.
This course will introduce students to data science for financial applications. Students will investigate a variety of empirical questions from different areas within finance including: FinTech, asset management, international finance, and corporate finance. The course will highlight how data analytics shape the way finance is practiced by focusing on problems currently confronting finance professionals. Restricted to College of Business major or minor with a minimum cumulative NDSU GPA of 2.50. Prereq: FIN 320 with a grade of C or better and students must be a junior or a senior.

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 major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see FIN 610.}.

FIN 420. Options, Futures, and Other Derivatives. 3 Credits.
Evaluation of options, futures, and other derivative securities used for hedging, speculation, and arbitrage. Related market structure, trading strategies, and risks are examined. Prereq: FIN 410 with a grade of C or better and restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see FIN 620.}.

FIN 430. Management of Financial Institutions. 3 Credits.
Development, role, and functions of depository financial institutions. Emphasis on domestic and international regulation, structure, management, and operations of commercial banks. Prereq: FIN 320. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see FIN 630.}.

FIN 440. International Finance. 3 Credits.
Concerns international financial markets, exchange rates, currency futures, and options. Includes financial aspects of international corporations such as management of corporate assets and liabilities, capital structure, cost of capital, capital budgeting, and international risks. Prereq: FIN 320. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see FIN 640.}.

FIN 450. Advanced Bank Management. 3 Credits.
This course provides an in-depth examination of the financial services industry, with a focus on depository institutions. Topics will include profitability, bank regulation and examination, lending, enterprise risk management, deposit operations, and several others. This course includes a bank profitability simulation. Prereq: FIN 320. Prereq or Coreq: Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. Dual-listing: FIN 650.

FIN 451. Credit Analysis. 3 Credits.
This course provides an in-depth examination of lending, with an emphasis on commercial credit. It will closely follow the Credit Essentials Course from the Risk Management Association, with the goal of preparing students for the Credit Essentials Certificate Examination through RMA at the end of the semester. Topics will include identifying customer needs, analyzing financial statements, loan structuring and documentation, and problem loan identification. Prereq: FIN 320. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

FIN 452. Real Estate Lending. 3 Credits.
This course will address specific topics related to lending against real estate, including common lending practices, valuation issues, documentation, and the unique risks associated with real estate lending. Prereq: FIN 320. Prereq or Coreq: Students must be a College of Business major or minor and a GPA over 2.50.

FIN 453. Risk Management in Banking. 3 Credits.
This course will address the management of multiple non-credit risks in banking, including cybersecurity risk, third-party, culture, operational and fraud risk, along with enterprise risk and other relevant topics. We will also examine careers in risk management within the banking industry. Prereq: FIN 320 and students must be a College of Business major or minor with a GPA over 2.50.

FIN 454. Retirement Planning. 3 Credits.
Survey of various types of retirement plans, ethical considerations in providing retirement planning services, assessing and forecasting financial needs in retirement, and integration of retirement plans with government benefits. Particular emphasis will be placed on life-cycle retirement planning. This begins preparing a student for entering the career field of Professional Financial Planning. Prereq: FIN 320 and FIN 430.

FIN 455. Estate Planning. 3 Credits.
Introduction to fundamentals of the estate planning process. Includes property transfer, tax consequences, probate avoidance, powers of appointment, and various tools/techniques used in implementing an effective estate plan. This course continues to prepare finance students for a career in Professional Financial Planning. Prereq: FIN 320 and FIN 430.

FIN 459. Intermediate Appraisal of Real Estate. 3 Credits.
This course expands the knowledge on the valuation of real estate. It includes the valuation of residential, commercial, and undeveloped land. It will also provide best practices in real estate valuation. This course will offer potential certified appraisers the information they need to conduct appraising. Prereq: FIN 320, BUSN/AGEC 347 and a 2.50 minimum NDSU grade point average.

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 major or minor and a 2.50 minimum NDSU grade point average.

FIN 470. Analysis of Fixed-Income Securities. 3 Credits.
An introduction to the valuation of fixed-income securities and the management of fixed-income investments. Prereq: FIN 320 with a grade of C or better and restricted to College of Business major or minor with a minimum cumulative NDSU GPA of 2.5. {Also offered for graduate credit - See FIN 670.}.

FIN 480. Applied Portfolio Management. 3 Credits.
This course combines theory with practice and provides students with a unique educational opportunity to study portfolio management through application. Students will gain real-time, hands-on experience in financial security analysis and valuation, asset allocation and portfolio management as applied to an actual investment portfolio. Students will also learn how to present their analysis of portfolio performance. Prereq: FIN 410 with a grade of C or better. {Also offered for graduate credit - See FIN 680.}.

FIN 491. Seminar. 1-5 Credits.

FIN 494. Individual Study. 1-5 Credits.

FIN 499. Special Topics. 1-5 Credits.

FIN 610. Investment Analysis and Management. 3 Credits.
Evaluation of various securities for investment (stocks, bonds), investment analysis (fundamental and technical), concepts of efficient markets, and market risk. Portfolio management and international investment aspects are briefly covered. {Also offered for undergraduate credit - see FIN 410.}.

FIN 620. Options, Futures, and Other Derivatives. 3 Credits.
Evaluation of options, futures, and other derivative securities used for hedging, speculation, and arbitrage. Related market structure, trading strategies, and risks are examined. Prereq: FIN 610 with a grade of C or better. {Also offered for undergraduate credit - see FIN 420.}.

FIN 630. Management of Financial Institutions. 3 Credits.
Development, role, and functions of depository financial institutions. Emphasis on domestic and international regulation, structure, management, and operations of commercial banks. {Also offered for undergraduate credit - see FIN 430.}.

FIN 640. International Finance. 3 Credits.
Concerns international financial markets, exchange rates, currency futures, and options. Includes financial aspects of international corporations such as management of corporate assets and liabilities, capital structure, cost of capital, capital budgeting, and international risks. {Also offered for undergraduate credit - see FIN 440.}.

FIN 650. Advanced Bank Management. 3 Credits.
This course provides an in-depth examination of the financial services industry, with a focus on depository institutions. Topics will include profitability, bank regulation and examination, lending, enterprise risk management, deposit operations, and several others. This course includes a bank profitability simulation and examines several topics from Finance 630 at a deeper level, along with a number of new topics. Prereq: FIN 630. {Also offered for undergraduate credit - see FIN 450.}.

FIN 670. Analysis of Fixed-Income Securities. 3 Credits.
An introduction to the valuation of fixed-income securities and the management of fixed-income investments. {Also offered for undergraduate credit - See FIN 470.}.

FIN 680. Applied Portfolio Management. 3 Credits.
This course combines theory with practice and provides students with a unique educational opportunity to study portfolio management through application. Students will gain real-time, hands-on experience in financial security analysis and valuation, asset allocation and portfolio management as applied to an actual investment portfolio. Students will also learn how to present their analysis of portfolio performance. {Also available for undergraduate credit - See FIN 480.}.

Food Safety (SAFE)

SAFE 452. Food Laws and Regulations. 3 Credits.
Regulations, laws, and dynamics governing development of food policy. {Also offered for graduate credit - see SAFE 652.}.

SAFE 484. Food Safety Practicum. 1-3 Credits.
Supervised experience to give students hands-on practice at addressing food safety problems. Placement with industry, government or academic settings will be arranged. Program permission required for registration. May be repeated for credit. {Also offered for graduate credit - see SAFE 684.}.

SAFE 485. Risk and Crisis Communication. 3 Credits.
Crisis communication practices in organizations of all types with emphasis on planning, emergency communication, image restoration, and organizational learning. Prereq: COMM 110. Cross-listed with COMM 485.

SAFE 494. Individual Study. 1-5 Credits.

SAFE 652. Food Laws and Regulations. 3 Credits.
Regulations, laws, and dynamics governing development of food policy. Cross-listed with CFS 652 and AGEC 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, AGEC 741. Cross-listed with AGEC 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 AGEC 725 and CFS 725.

SAFE 753. Food Toxicology. 2 Credits.
Discussions on the properties of toxic substances found both naturally and as contaminants in foods, the hazards they present to humans and their food supplies, and ways to reduce risks.

SAFE 785. Advanced Crisis Communication. 3 Credits.
Long- and short-term issues for managing communication related to organizational crises are discussed in the stages of pre-crisis, crisis and post-crisis.

SAFE 786. Risk Communication. 3 Credits.
Explores the relationship between communication strategies and risk perception, assessment, and management. Cross-listed with COMM 786.

SAFE 790. Graduate Seminar. 1-3 Credits.

SAFE 791. Temporary/Trial Topics. 1-5 Credits.

SAFE 793. Individual Study/Tutorial. 1-5 Credits.

SAFE 794. Practicum/Internship. 1-10 Credits.

SAFE 795. Field Experience. 1-15 Credits.

SAFE 796. Special Topics. 1-5 Credits.

SAFE 797. Master's Paper. 1-3 Credits.

SAFE 798. Master's Thesis. 1-10 Credits.

SAFE 899. Doctoral Dissertation. 1-15 Credits.

French (FREN)

FREN 101. First-Year French I. 4 Credits.
Basic structures and vocabulary of French. Practice in the fundamentals of listening, speaking, reading, and writing. No previous knowledge of French required.

FREN 102. First-Year French II. 4 Credits.
Basic structures and vocabulary of French. Practice in the fundamentals of listening, speaking, reading, and writing. Prereq: FREN 101.

FREN 191. Seminar. 1-5 Credits.

FREN 194. Individual Study. 1-5 Credits.

FREN 196. Field Experience. 1-15 Credits.

FREN 199. Special Topics. 1-5 Credits.

FREN 201. Second-Year French I. 3 Credits.
Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary readings. Prereq: FREN 102.

FREN 202. Second-Year French II. 3 Credits.
Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary readings. Prereq: FREN 201.

FREN 220. French and Francophone Culture. 3 Credits.
Exploration of French and Francophone culture (including everyday culture, film, literature, politics, history, geography, etc.). A broad overview of cultural aspects of French-speaking societies. No prerequisites. Taught in English.

FREN 291. Seminar. 1-3 Credits.

FREN 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

FREN 294. Individual Study. 1-5 Credits.

FREN 299. Special Topics. 1-5 Credits.

FREN 311. French Conversation and Composition I. 3 Credits.
Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: FREN 202.

FREN 312. French Conversation and Composition II. 3 Credits.
Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: FREN 202.

FREN 315. Contemporary France. 3 Credits.
An interdisciplinary study of present-day France; discussion of the political, social, and cultural context, including a brief historical overview and the role of France within the global community. Taught in French. Prereq: FREN 312.

FREN 340. The French-Speaking World. 3 Credits.
Study of works by Francophone writers and the history and cultures that influence their writings. Taught in French. Repeatable for credit with change in topic. Prereq: FREN 312 or equivalent.

FREN 345. Women in French Literature. 3 Credits.
Study of works by French and Francophone women writers of different literary periods; portrayals of women by French male and female authors. Taught in English and French. Prereq: FREN 312 or permission of instructor.

FREN 350. Introduction to French Linguistics and Pronunciation. 3 Credits.
Study of the basic nature and function of languages as applied to French. Application of principles of phonetics to the pronunciation of the French language, plus extended practice in diction and intonation. Prereq: FREN 312.

FREN 360. Studies in Language and Style. 3 Credits.
Focus on the theory and practice of writing in multiple genres in French. Taught in French. Prereq: FREN 312, ENGL 120 and junior standing.

FREN 365. Advanced Conversation Through Contemporary Culture. 3 Credits.
Advanced practice oral skills in the context of contemporary current events in France and the Francophone world; may be repeated for credit. Taught in French. Prereq: FREN 312.

FREN 370. Translation: Practice and Theory. 3 Credits.
Introduction to basic concepts, strategies, and issues in translation; practice and development of skills and techniques for translation of a wide variety of texts. Taught in French and English. Prereq: FREN 312. May be repeated for credit.

FREN 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

FREN 381. Masterpieces of French Literature in Translation. 3 Credits.
Designed for those with no background in French. Introduction to important writers of several periods. Taught in English. Does not count toward a French major or minor.

FREN 391. Seminar. 1-3 Credits.

FREN 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

FREN 394. Individual Study. 1-5 Credits.

FREN 399. Special Topics. 1-5 Credits.

FREN 401. Approaches to Literature. 3 Credits.
Introduction to a variety of critical approaches to literature; how to read, understand, and write about French and Francophone texts from various genres and periods. Taught in French. Prereq: FREN 312.

FREN 410. French Literature & Culture before 1800. 3 Credits.
Overview of the cultural and political history of France before the Revolution and an introduction to important writers and artists through representative works. Taught in French. Prereq: FREN 312.

FREN 412. French Literature & Culture since 1800. 3 Credits.
Overview if the cultural and political history of France since the Revolution and an introduction to important authors and artists through representative works. Taught in French. Prereq: FREN 312. (alternate years).

FREN 420. Themes & Topics in French Literature & Culture. 3 Credits.
Exploration of a significant theme or topic in French or Francophone literature and culture (e.g. the comic; philosophy & literature) not routinely included in the curriculum. May be repeated for credit with change in topic or theme. Taught in French. Prereq: FREN 312.

FREN 422. Genres in French Literature. 3 Credits.
In-depth study of works in French on a specific genre. Course may be repeated for credit with change in genre. Taught in French. Prereq: FREN 312.

FREN 489. Senior Thesis. 1 Credit.
Integrative capstone experience for seniors majoring in French; faculty guided research within the context of a 400-level literature or culture course leading to a substantive written project in French and its oral presentation to faculty and departmental majors. Prereq: Senior standing; study abroad.

FREN 491. Seminar. 1-5 Credits.

FREN 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

FREN 494. Individual Study. 1-5 Credits.

FREN 496. Field Experience. 1-15 Credits.

FREN 499. Special Topics. 1-5 Credits.

Geography (GEOG)

GEOG 105. Fundamentals of Geographic Information Systems. 3 Credits.
Basics of integration and analyses of spatial data to visualize relationships, seek explanations, and develop solutions to problems. Emphases are placed on the nature of geographic information and the ways digital methods support geographic analyses and modeling.

GEOG 151. Human Geography. 3 Credits.
Non-ethnocentric understanding of geography of human lifestyles and activities; their place and role in human-environment interaction.

GEOG 161. World Regional Geography. 3 Credits.
Study of geographic processes shaping major world regions and inter-relationships in the global village; geographic bases and implications of current world events.

GEOG 194. Individual Study. 1-3 Credits.

GEOG 196. Field Experience. 1-15 Credits.

GEOG 199. Special Topics. 1-5 Credits.

GEOG 262. Geography of North America. 3 Credits.
Spatial approach to the development of the United States and Canada, which stresses changing cultural landscapes and assessing impacts of planning for resource utilization.

GEOG 291. Seminar. 1-3 Credits.

GEOG 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GEOG 294. Individual Study. 1-5 Credits.

GEOG 299. Special Topics. 1-5 Credits.

GEOG 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

GEOG 391. Seminar. 1-3 Credits.

GEOG 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GEOG 394. Individual Study. 1-5 Credits.

GEOG 399. Special Topics. 1-5 Credits.

GEOG 412. Geomorphology. 3 Credits.
Land forms and the processes by which they are formed and modified. Prereq: GEOL 105, GEOL 105L. Cross-listed with GEOL 412. {Also offered for graduate credit - see GEOG 612.}.

GEOG 455. Introduction to Geographic Information Systems. 4 Credits.
Application of the principles of geographic information systems and integrally related mapping to solve problems related to environment site characterizations, resource exploration, soil and groundwater contamination, geological and geotechnical investigations, waste management, construction, etc. Comprehensive lab assignments included to give students hands-on experience solving probems with current state-of-the-art software and hardware, digitizers, scanners, and GPS units. {Also offered for graduate credit - see GEOG 655.}.

GEOG 456. Advanced Geographic Information Systems. 3 Credits.
Application and analysis of advanced techniques and principles of geographic information systems and remote sensing technologies to fully address spatial and time related problems related to urban site characterizations, hydrologi analyses, risk assessment, policy making, disaster response and 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 455. {Also offered for graduate credit - see GEOG 656.}.

GEOG 465. Remote Sensing of the Environment. 3 Credits.
This course will focus on developing practical skills for using various types of accessible remote sensing technologies as applied to environmental sciences. We will learn to work with aerial photographs, aerial lidar data, Terrestrial Laser Scanning (TLS), structure from motion (sfm), and Unmanned Aerial Vehicles (UAVs). We will explore the drawbacks and benefits of each technology and how it can be used to gather information and measure change in the environment. Cross-listed with GEOL 465. Dual-listing: GEOG 665.

GEOG 470. Remote Sensing. 3 Credits.
Application of principles of Remote Sensing technology to integrate multiple interrelated data, to identify and/or accentuate spectral indices, magnetic force, electromagnetic energy and other remotely collected data to analyze temporal and spatial variation. Cross-listed with GEOL. {Also offered for graduate credit - see GEOG 670.}.

GEOG 480. Geographic Information Systems Pattern Analysis and Modeling. 3 Credits.
Application of GIS for determination of: factors or variables that influence geospatial patterns, data limitations in spatial and temporal continuum scales, identification of data anomalies, optimal data prediction, and evaluation of prediction uncertainty. Prereq: GEOG 455. Cross-listed with GEOL 480. {Also offered for graduate credit - see GEOG 680.}.

GEOG 491. Seminar. 1-5 Credits.

GEOG 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GEOG 494. Individual Study. 1-5 Credits.

GEOG 496. Field Experience. 1-15 Credits.

GEOG 499. Special Topics. 1-5 Credits.

GEOG 612. Geomorphology. 3 Credits.
Land forms and the processes by which they are formed and modified. Cross-listed with GEOL 612. {Also offered for undergraduate credit - see GEOG 412.}.

GEOG 655. Introduction to Geographic Information Systems. 4 Credits.
Application of the principles of geographic information systems and integrally related mapping to solve problems related to environment site characterizations, resource exploration, soil and groundwater contamination, geological and geotechnical investigations, waste management, construction, etc. Comprehensive lab assignments included to give students hands-on experience solving probems 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 665. Remote Sensing of the Environment. 3 Credits.
This course will focus on developing practical skills for using various types of accessible remote sensing technologies as applied to environmental sciences. We will learn to work with aerial photographs, aerial lidar data, Terrestrial Laser Scanning (TLS), structure from motion (sfm), and Unmanned Aerial Vehicles (UAVs). We will explore the drawbacks and benefits of each technology and how it can be used to gather information and measure change in the environment. Cross-listed with GEOL 665. Dual-listing: GEOG 465.

GEOG 670. Remote Sensing. 3 Credits.
Application of principles of Remote Sensing technology to integrate multiple interrelated data, to identify and/or accentuate spectral indices, magnetic force, electromagnetic energy and other remotely collected data to analyze temporal and spatial variation. Cross-listed with GEOL. {Also offered for undergraduate credit - see GEOG 470.}.

GEOG 680. Geographic Information Systems Pattern Analysis and Modeling. 3 Credits.
Application of GIS for determination of: factors or variables that influence geospatial patterns, data limitations in spatial and temporal continuum scales, identification of data anomalies, optimal data prediction, and evaluation of prediction uncertainty. Prereq: GEOG 655. Cross-listed with GEOL 680. {Also offered for undergraduate credit - see GEOG 480.}.

GEOG 696. Special Topics. 1-5 Credits.

Geology (GEOL)

GEOL 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. Geology of the Red River Valley. 1 Credit.
Field study of Mesozoic and Cenozoic sediments, landforms, and geological processes that have shaped the landscape of the Red River Valley. Two-day field excursion and a report. Fee required. Recommended: GEOL 105 or GEOL 106.

GEOL 150. Concepts, Skills, and Ethics in Geoscience. 2 Credits.
This course introduces students to the geology major at NDSU. Students will learn basic skills for academic success along with specific skills and concepts in geosciences, including literature research, interdisciplinary scientific principles, field and lab safety, maps and geographic information systems, data analysis, computation and programming, and career paths in geoscience. The course will be team taught, with in-class active learning exercises, discussion, homework, and guest speakers.

GEOL 194. Individual Study. 1-5 Credits.

GEOL 196. Field Experience. 1-15 Credits.

GEOL 199. Special Topics. 1-5 Credits.

GEOL 201. Climate Change and Energy. 3 Credits.
Exploration and analysis of Earth system processes, geologic and instrumental records of global-scale climate change, and the interrelationship of climate change and energy consumption from fossil fuels.

GEOL 219. Oceanography. 3 Credits.
Ocean formation and dynamics over geologic time; waves and energy transfer of oceans; oceanic effects on world climates; coastal hazards.

GEOL 291. Seminar. 1-3 Credits.

GEOL 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GEOL 294. Individual Study. 1-5 Credits.

GEOL 299. Special Topics. 1-5 Credits.

GEOL 300. Environmental Geology. 3 Credits.
Human interaction with Earth's environment. Earthquakes, floods, volcanoes, landslides, water use, pollution, energy, mining, and land-use planning. Recommended: GEOL 105, GEOL 105L. (alternate years).

GEOL 301. Lake Superior Field Course. 2 Credits.
Stratigraphy, mineralogy, and economic geology of northern Minnesota and northwestern Ontario. Weekly lecture, plus six-day field excursion. Offered periodically. Fee required. Recommended: GEOL 105, GEOL 105L, GEOL 106, GEOL 106L.

GEOL 302. Black Hills Field Course. 2 Credits.
Stratigraphy, structure, and mineralogy of the Black Hills and Williston Basin. Weekly lectures, plus seven-day field excursion. Offered periodically. Fee required. Recommended: GEOL 105, GEOL 105L, GEOL 106, GEOL 106L.

GEOL 303. Paleontology Field Course. 1 Credit.
Paleozoic stratigraphy and paleontology of southeastern Minnesota and northern Iowa. Lecture by arrangement, 1 three and one-half day field excursion. Fee required. Recommended: GEOL 106, GEOL 106L. (alternate years).

GEOL 310. Planetary Geology. 3 Credits.
Survey of planetary geology reinforcing concepts of physical geology; formation and composition of the solar system, comparative planetary geology and geomorphology, extra-solar systems and habitable worlds, astrobiology. Recommended: GEOL 105.

GEOL 350. Invertebrate Paleontology. 3 Credits.
Survey of invertebrate fossils emphasizing systematics, environments and as stratigraphic markers. Recommended: GEOL 106, GEOL 106L. (alternate years).

GEOL 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

GEOL 391. Seminar. 1-3 Credits.

GEOL 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GEOL 394. Individual Study. 1-5 Credits.

GEOL 397. Coop Ed/Internship. 1-4 Credits.

GEOL 399. Special Topics. 1-5 Credits.

GEOL 410. Sedimentology/Stratigraphy. 4 Credits.
Origin and classification of sedimentary rocks and their stratigraphic relationships. 3 lectures, 1 laboratory. Recommended: GEOL 105, GEOL 105L, GEOL 106, GEOL 106L. (alternate years).

GEOL 412. Geomorphology. 3 Credits.
Land forms and the processes by which they are formed and modified. 3 lectures, 1 two-hour laboratory. Recommended: GEOL 105, GEOL 105L. Cross-listed with GEOG. {Also offered for graduate credit - see GEOL 612.}.

GEOL 413. Glacial Geology. 3 Credits.
Glaciers as agents of geologic change; evolution of landforms and landscapes shaped by glaciers; glaciers and glacial landscapes as records of global climate and environmental change; glacial history of North America. Recommended: GEOL 105, GEOL 105L. {Also offered for graduate credit - see GEOL 613.}.

GEOL 414. Hydrogeology. 3 Credits.
Concepts of surface and groundwater hydrogeology in natural systems; the hydrologic cycle; physical properties of aquifers and subsurface flow; open channel flow; natural aqueous geochemistry. Prereq: GEOL 105, MATH 146 or MATH 165, CHEM 121 or CHEM 160. Coreq or prereq: GEOL 105L, MATH 147 or MATH 166. {Also offered for graduate credit - see GEOL 614.}.

GEOL 420. Mineralogy. 3 Credits.
Crystal forms, crystal chemistry, and formation of non-silicate and silicate minerals. Recommended: CHEM 121 or CHEM 150. (alternate years) {Also offered for graduate credit - see GEOL 620.}.

GEOL 421. Mineralogy Laboratory. 1 Credit.
Identification and classification of minerals using morphology, physical properties, XRF and XRD. Coreq: GEOL 420. (alternate years) {Also offered for graduate credit - see GEOL 621.}.

GEOL 422. Petrology. 3 Credits.
Principles of igneous and metamorphic petrology including geochemistry, phase relations, and rock forming processes. Prereq: GEOL 420. (alternate years) {Also offered for graduate credit - see GEOL 622.}.

GEOL 423. Petrography. 1 Credit.
Identification and classification of rocks in hand specimens and thin sections. Optical mineralogy. Field and laboratory projects required. Prereq: GEOL 422. (alternate years) {Also offered for graduate credit - see GEOL 623.}.

GEOL 428. Geochemistry. 3 Credits.
Introduction to geochemistry: chemistry of the Earth, groundwater, isotopes, global geochemical cycles, geochemical modeling, and environmental geochemistry. Recommended: CHEM 121 or CHEM 150. Cross-listed with CHEM 428. (alternate years) {Also offered for graduate credit - see GEOL 628.}.

GEOL 450. Field Geology. 3 Credits.
Interpretation of geology in the field; preparation of base maps and plotting geological data. Lectures and one-week fieldwork. Fee required. Prereq: GEOL 410, GEOL 421, GEOL 423, GEOL 457. (alternate years) {Also offered for graduate credit - see GEOL 650.}.

GEOL 457. Structural Geology. 4 Credits.
Dynamics of rock deformation and analyses of Earth structure. Recommended: GEOL 105, GEOL 105L, MATH 105. (alternate years) {Also offered for graduate credit - see GEOL 657.}.

GEOL 460. Biogeochemistry. 3 Credits.
An overview of how life affects Earth's chemistry, examining interactions between the atmosphere, the land surface, and the oceans. Biotic mechanisms will be followed via the global cycles of biologically relevant elements stressing human impacts. Recommended: GEOL 105, GEOL 105L, GEOL 106, GEOL 106L, CHEM 121, CHEM 122, BIOL 150, BIOL 151. {Also offered for graduate credit - see GEOL 660.}.

GEOL 465. Remote Sensing of the Environment. 3 Credits.
This course will focus on developing practical skills for using various types of accessible remote sensing technologies as applied to environmental sciences. We will learn to work with aerial photographs, aerial lidar data, Terrestrial Laser Scanning (TLS), structure from motion (sfm), and Unmanned Aerial Vehicles (UAVs). We will explore the drawbacks and benefits of each technology and how it can be used to gather information and measure change in the environment. Cross-listed with GEOG 465. Dual-listing: GEOL 665.

GEOL 470. Remote Sensing. 3 Credits.
Application of principles of Remote Sensing technology to integrate multiple interrelated data, to identify and/or accentuate spectral indices, magnetic force, electromagnetic energy and other remotely collected data to analyze temporal and spatial variation. Cross-listed with GEOG. {Also offered for graduate credit - see GEOL 670.}.

GEOL 480. Geographic Information Systems Pattern Analysis and Modeling. 3 Credits.
Application of GIS for determination of: factors or variables that influence geospatial patterns, data limitations in spatial and temporal continuum scales, identification of data anomalies, optimal data prediction, and evaluation of prediction uncertainty. Prereq: GEOG 455. Cross-listed with GEOG 480. {Also offered for graduate credit - see GEOL 680.}.

GEOL 491. Seminar. 1-5 Credits.

GEOL 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GEOL 493. Undergraduate Research. 1-5 Credits.

GEOL 494. Individual Study. 1-5 Credits.

GEOL 496. Field Experience. 1-15 Credits.

GEOL 499. Special Topics. 1-5 Credits.

GEOL 612. Geomorphology. 3 Credits.
Land forms and the processes by which they are formed and modified. 3 lectures, 1 two-hour laboratory. Cross-listed with GEOG. {Also offered for undergraduate credit - see GEOL 412.}.

GEOL 613. Glacial Geology. 3 Credits.
Glaciers as agents of geologic change; evolution of landforms and landscapes shaped by glaciers; glaciers and glacial landscapes as records of global climate and environmental change; glacial history of North America. {Also offered for undergraduate credit - see GEOL 413.}.

GEOL 614. Hydrogeology. 3 Credits.
Concepts of surface and groundwater hydrogeology in natural systems; the hydrologic cycle; physical properties of aquifers and subsurface flow; open channel flow; aqueous geochemistry. {Also offered for undergraduate credit - see GEOL 414.}.

GEOL 620. Mineralogy. 3 Credits.
Crystal forms, crystal chemistry, and formation of non-silicate and silicate minerals. (alternate years) {Also offered for undergraduate credit - see GEOL 420.}.

GEOL 621. Mineralogy Laboratory. 1 Credit.
Identification and classification of minerals using morphology, physical properties, XRF and XRD. Coreq: GEOL 620. (alternate years) {Also offered for undergraduate credit - see GEOL 421.}.

GEOL 622. Petrology. 3 Credits.
Principles of igneous and metamorphic petrology including geochemistry, phase relations, and rock forming processes. Prereq: GEOL 620. (alternate years) {Also offered for undergraduate credit - see GEOL 422.}.

GEOL 623. Petrography. 1 Credit.
Identification and classification of rocks in hand specimens and thin sections. Optical mineralogy. Field and laboratory projects required. Prereq: GEOL 622. (alternate years) {Also offered for undergraduate credit - see GEOL 423.}.

GEOL 628. Geochemistry. 3 Credits.
Introduction to geochemistry: chemistry of the Earth, groundwater, isotopes, global geochemical cycles, geochemical modeling, and environmental geochemistry. Cross-listed with CHEM 628. (alternate years) {Also offered for undergraduate credit - see GEOL 428.}.

GEOL 650. Field Geology. 3 Credits.
Interpretation of geology in the field; preparation of base maps and plotting geological data. Lectures and one-week fieldwork. Fee required. Prereq: GEOL 610, GEOL 621, GEOL 623, GEOL 657. (alternate years) {Also offered for undergraduate credit - see GEOL 450.}.

GEOL 657. Structural Geology. 4 Credits.
Dynamics of rock deformation and analyses of Earth structure. (alternate years) {Also offered for undergraduate credit - see GEOL 457.}.

GEOL 660. Biogeochemistry. 3 Credits.
An overview of how life affects Earth's chemistry, examining interactions between the atmosphere, the land surface, and the oceans. Biotic mechanisms will be followed via the global cycles of biologically relevant elements stressing human impacts.{Also offered for undergraduate credit - see GEOL 460.}.

GEOL 665. Remote Sensing of the Environment. 3 Credits.
This course will focus on developing practical skills for using various types of accessible remote sensing technologies as applied to environmental sciences. We will learn to work with aerial photographs, aerial lidar data, Terrestrial Laser Scanning (TLS), structure from motion (sfm), and Unmanned Aerial Vehicles (UAVs). We will explore the drawbacks and benefits of each technology and how it can be used to gather information and measure change in the environment. Cross-listed with GEOG 665. Dual-listing: GEOL 465.

GEOL 680. Geographic Information Systems Pattern Analysis and Modeling. 3 Credits.
Application of GIS for determination of: factors or variables that influence geospatial patterns, data limitations in spatial and temporal continuum scales, identification of data anomalies, optimal data prediction, and evaluation of prediction uncertainty. Prereq: GEOG 655. Cross-listed with GEOG 680. {Also offered for undergraduate credit - see GEOL 480.}.

GEOL 695. Field Experience. 1-15 Credits.

GEOL 696. Special Topics. 1-5 Credits.

GEOL 712. Topics in Geomorphology. 3 Credits.
This course focuses on developing an understanding of how Earth surface processes shape the landscape and how these processes relate to research in a broad range of disciplines.

GEOL 760. Advanced Biogeochemistry. 3 Credits.
Examines the nature of the interaction between Earth's biogeochemical cycles and climate and how this interaction has evolved over time and will change in the future. Recommended: GEOL 660.

GEOL 793. Individual Study/Tutorial. 1-5 Credits.

German (GERM)

GERM 101. First-Year German I. 4 Credits.
Basic structures and vocabulary of German. Practice in the fundamentals of listening, speaking, reading, and writing. No previous knowledge of German required.

GERM 102. First-Year German II. 4 Credits.
Basic structures and vocabulary of German. Practice in the fundamentals of listening, speaking, reading, and writing. Prereq: GERM 101.

GERM 194. Individual Study. 1-5 Credits.

GERM 196. Field Experience. 1-15 Credits.

GERM 199. Special Topics. 1-5 Credits.

GERM 201. Second-Year German I. 3 Credits.
Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary reading. Prereq: GERM 102.

GERM 202. Second-Year German II. 3 Credits.
Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary reading. Prereq: GERM 201.

GERM 220. German Culture & Society. 3 Credits.
Exploration of German culture (including everyday culture, film, and literature), politics, history, geography, and religion. A broad overview with particular emphasis on Germany since 1945. Taught in English.

GERM 291. Seminar. 1-3 Credits.

GERM 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GERM 294. Individual Study. 1-5 Credits.

GERM 299. Special Topics. 1-5 Credits.

GERM 311. German Conversation and Composition I. 3 Credits.
Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: GERM 202.

GERM 312. German Conversation and Composition II. 3 Credits.
Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: GERM 311 or equivalent.

GERM 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

GERM 391. Seminar. 1-3 Credits.

GERM 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GERM 394. Individual Study. 1-5 Credits.

GERM 399. Special Topics. 1-5 Credits.

GERM 491. Seminar. 1-5 Credits.

GERM 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GERM 494. Individual Study. 1-5 Credits.

GERM 496. Field Experience. 1-15 Credits.

GERM 499. Special Topics. 1-5 Credits.

Global Studies (GLBL)

GLBL 394. Individual Study. 1-5 Credits.

GLBL 397. Fe/Coop Ed/Internship. 1-15 Credits.

GLBL 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

Health, Nutrition & Exercise Sciences (HNES)

HNES 100. Concepts of Fitness & Wellness. 2 Credits.
Facts about exercise and physical fitness.

HNES 111. Wellness. 3 Credits.
Examination of personal lifestyle choices related to emotional, nutritional, and mental well-being.

HNES 167. Esports. 1 Credit.
This course is designed to teach you to play different types of Esport games. It will acquaint you with the rules of these games as well as teach game and socialization etiquette. Students will compete in class against classmates, as well as people all over the world. As new games come out, they will be added and as games are no longer played, they will be removed.

HNES 170. Introduction to Exercise Science. 2 Credits.
Investigation of various Exercise Science career opportunities within the field and the professional track at NDSU.

HNES 190. Introduction to Sport Management. 3 Credits.
This course is designed to introduce students to various concepts that make up the foundation and underlying principles of sport management. In addition, program expectations are covered and a focus is placed on professional development.

HNES 192. Sport Management Practicum. 1 Credit.
This course provides preparation for successful completion of the sport management degree. Includes field experience designed to give students preliminary experience working in a sport setting as well as instruction designed to guide students in their chosen career path. May be repeated for credit. Prereq: HNES 190 with a grade of B or higher. Prereq or Coreq: Sport management major.

HNES 194. Individual Study. 1-5 Credits.

HNES 196. Field Experience. 1-15 Credits.

HNES 199. Special Topics. 1-5 Credits.

HNES 226. Socio-Cultural Dimension in Sport. 3 Credits.
Students will gain a level of understanding of how sport has and does contribute to the notion of nation building in North America and across the world. Prereq: HNES 190.

HNES 250. Nutrition Science. 3 Credits.
Scientific principles of nutrition based on chemical structure and function of the nutrients. 3 lectures.

HNES 251. Nutrition, Growth and Development. 3 Credits.
Examination of growth and nutrient needs through the lifecycle.

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.

HNES 261L. Food Selection and Preparation Principles Laboratory. 2 Credits.
Illustrates and extends lecture topics and stresses practical application of scientific food preparation principles.

HNES 276. Professional Observation. 1 Credit.
Observation in a setting providing established health-fitness services. Prereq: HNES 170 and HNES 272.

HNES 291. Seminar. 1-5 Credits.

HNES 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HNES 294. Individual Study. 1-3 Credits.

HNES 299. Special Topics. 1-5 Credits.

HNES 303. Sport Communication and New Media. 3 Credits.
The purpose of this course is to understand the role of communication, new media, and emerging technologies in the sports industry including such fields as public relations, media relations, community relations, and promotions. Prereq or Coreq: Sport Management major or permission of the instructor.

HNES 304. Sport Promotion and Public Relations. 3 Credits.
This course explores the aspects of the sports promotion industry and how industry interfaces with the consumer. Theories of sport promotion and public relations will be related to promotion efficacy. Prereq: HNES 190 and HNES 226 Sport Management students only or with instructor permission.

HNES 323. Ethics of Sport. 3 Credits.
Understand ethical reasonings and issues relevant to the sport industry across a range of areas, including professional sport, collegiate sport, and youth sport. Prereqs: HNES 190 and restricted to Sport Management majors.

HNES 351. Metabolic Basis of Nutrition. 4 Credits.
Biochemical and physiological principles of human nutrition. Nutrients in relation to metabolic regulation. Prereq: HNES 250 and BIOC 260 or BIOC 460 Student must be a Nutrition Science major.

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 and HNES 351 Student must be a Nutrition Science major.

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 four-hour laboratory. Prereq: HNES 251, HNES 351. Coreq: HNES 354.

HNES 361. Foodservice Systems Management I. 3 Credits.
Principles and methods of purchasing, production, and management for quantity foodservice operations.

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.

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 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 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: HNES 374. Prereq or Coreq: Exercise Science major.

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 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 majors 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 majors only.

HNES 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

HNES 380. Exercise Behavior. 3 Credits.
Methods to facilitate the adoption of and optimize adherence to exercise programs and other healthy behaviors by using motivational interviewing, behavior change models and theories, and other advanced exercise education principles. Prereq: HNES 374 Prereq or Coreq: Exercise Science major.

HNES 388. Prevention and Care of Athletic Injuries. 3 Credits.
This course is designed to introduce the student to basic care, treatment, and prevention of athletic related injuries. Other sports medicine concepts will also be discussed.

HNES 391. Seminar. 1-3 Credits.

HNES 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HNES 393. Undergraduate Research. 1-5 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 CHP.

HNES 401. Principles of Intercollegiate Athletics Administration. 3 Credits.
This course provides students with a comprehensive foundation concerning the administration of college sport. Students will learn about the different functions of intercollegiate athletics departments. Students will also examine contemporary issues related to intercollegiate athletics specifically, social, ethical, financial, economic, and management matters in college sport. Dual-listing: HNES 601.

HNES 404. 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 program only.

HNES 414. Global Perspectives in Sport. 3 Credits.
The impact of globalization trends on the sport industry. The course explores various theories of globalization as they relate to the business of sport. Prereq: HNES 190, HNES 226, HNES 304 Prereq or Coreq: Sport Management majors only Dual-listing: HNES 614.

HNES 415. The Olympic Games and Mega-Sporting Events. 3 Credits.
Students will examine the role of the Olympic Games and other mega-sporting events within the global sports industry. They will learn about the governance structures of international sport organizations and mega-sporting events as well as political, economic, social, and environmental implications for the future of mega-sporting events. Dual-listing: HNES 615.

HNES 416. Foundations in African Sport. 3 Credits.
This course provides a comprehensive examination of sport on the African continent, including historical, sociological, economic, cultural and political perspectives. Students will examine the different sport systems across the different regions on the African continent including how community and professional sport operate. Dual-listing: HNES 616.

HNES 417. Foundations in European Sport. 3 Credits.
This course provides a comprehensive examination of sport on the European continent, including historical, sociological, economic, cultural and political perspectives. Students will examine the different sport systems across the different regions in Europe, including the operation of community and professional sport. In addition, students will examine how the European sport system fits in the greater global sports industry. Prereq or Coreq: Sport management major only. Dual-listing: HNES 617.

HNES 418. Foundations of Sport in Oceania. 3 Credits.
This course provides a comprehensive examination of sport in Oceania, including historical, sociological, economic, cultural and political perspectives. Students will examine the different sport systems across the different countries in Oceania, with an emphasis on the sport systems of Australia and New Zealand (Aotearoa). This examination includes the operation of community and professional sport. In addition, students will examine how the sport system of Oceania fits in the greater global sports industry. Dual-listing: HNES 618.

HNES 419. Foundations in Asian Sport. 3 Credits.
This course provides a comprehensive examination of sport on the Asian continent, including historical, sociological, economic, cultural, and political perspectives. Students will examine the different sport systems across the different regions in Asia including the operation of community and professional sport. In addition, students will examine how the Asian sport system fits in the greater global sports industry. Dual-listing: HNES 619.

HNES 421. Foundations of Sport in the Americas. 3 Credits.
This course provides a comprehensive examination of sport in North, Central and South America and the Caribbean, including historical, sociological, economic, cultural, and political perspectives. Students will examine the different sport systems across the different regions in the Americas including the operation of community and professional sport. In addition, students will examine how the American sport systems fit in the greater global sports industry. Prereq or Coreq: Restricted to Sport Management program or permission of instructor. Dual-listing: HNES 621.

HNES 425. Strategic Sport Marketing. 3 Credits.
This course provides a strategic framework to understand market dynamics, trends, consumer behavior, products, delivery systems, and marketing and promotional strategies that shape and drive the sports marketing industry. Prereq: HNES 190, HNES 226, HNES 304. Prereq or Coreq: Restricted to Sport Management majors only. Dual-listing: HNES 625.

HNES 426. Foundations of Sport Management. 3 Credits.
The course is an in-depth analysis of the relationship of sport and management. The study of sport includes sporting goods manufacturers; fitness centers; recreation departments; broadcasting; Little League teams; and high school, NCAA, and professional leagues. The study of management follows the four functions of management: planning, organizing, leading, and controlling. Prereq: HNES 190, HNES 226, HNES 304. Prereq or Coreq: Junior standing and Sport Management majors only. Dual-listing: HNES 626.

HNES 431. Sport Law. 3 Credits.
This course will address major legal issues a person might face working in the sport industry whether as a coach, teacher, program administrator in a recreation program, or working in a high school, college, Olympic, or professional sport organization. Includes an examination of the governing bodies of various sports organizations. Prereq: HNES 190 and HNES 226. Prereq or coreq: Sport Management students only or with instructor permission.

HNES 436. Sport Facility and Event Management. 3 Credits.
The course provides an overview of planning, development, and operation of sport facilities and sport events. The course includes methods to measure sport facility and event performance. Prereq: HNES 190, HNES 226, HNES 304. Prereq or coreq: Sport Management majors only or with instructor permission.

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. 3 Credits.
Application of nutrition education and program development in community settings. Coreq: HNES 442. {Also offered for graduate credit - see HNES 642L.}.

HNES 444. Sport Finance. 3 Credits.
A study of economic and financial aspects as they relate to the sports industry. Examines revenue generation, budgeting, stadium funding, and franchise valuation, with a focus on the current challenges facing sports organizations at the pro, college, and local levels. Prereq: HNES 190, HNES 226, and ECON 105. Prereq or Coreq: Sport Management majors only or with instructor permission. Dual-listing: HNES 644.

HNES 458. Advanced Medical Nutrition Therapy. 4 Credits.
Principles in the nutrition care of patients with conditions requiring nutrition care. Prereq: HNES 354. Prereq or coreq: Accelerated Coordinated Program in Nutrition Science and Dietetics major. Dual-listing: HNES 658.

HNES 458L. Advanced Medical Nutrition Therapy Laboratory. 3 Credits.
Supervised practice for students in the Coordinated Program in Dietetics to accompany Advanced Medical Nutrition Therapy course. Students gain practical experience in the nutrition care of patients with conditions requiring medical nutrition therapy. Prereq: HNES 354 and HNES 354L.

HNES 465. Exercise Physiology. 3 Credits.
Effects of exercise on the physiology of the human body, including aerobic systems, strength/muscle adaptations, body composition, training programs, and other areas related to training. Prereq: HNES 365. Coreq: HNES 465L. Prereq or Coreq: Student must be an Exercise Science major.

HNES 465L. Exercise Physiology Laboratory. 1 Credit.
Laboratory exercises to test aerobic and anaerobic capacity, strength, body composition, and dietary analysis. Coreq: HNES 465.

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 majors only.

HNES 468. Foodservice Systems Management II. 1 Credit.
This course focuses on leadership, team-building, and professional communication in Nutrition Science & Dietetics. Leadership and communication theories will be applied to everyday practices to prepare participants to be successful leaders in the workforce. Dual-listing: HNES 668.

HNES 468L. Foodservice Systems Management II Laboratory. 1 Credit.
Supervised practice for CPD students in foodservice to accompany HNES 468/668.

HNES 470. Professional Practices in Exercise Science. 3 Credits.
Professional practices and responsibilities in exercise science, including risk management, facility operations, emergency procedures, fiscal management, scope of practice, ethics, and legal issues. Prereq: HNES 371.

HNES 472. Exercise Assessment and Prescription. 3 Credits.
This course will focus on physiological testing procedures applicable to physical activity and fitness settings, applying exercise prescriptions. Prereq: HNES 465. Coreq: HNES 476. Prereq or Coreq: Exercise Science major.

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. 3-12 Credits.
Capstone course for exercise science majors. Supervised field work in a professional setting with emphasis on exercise testing and prescription, exercise program leadership, and administration. Prereq: Exercise Science majors only and Department Consent Required.

HNES 476. Exercise Testing Laboratory. 3 Credits.
This course will focus on the hands-on physiological testing procedures applicable to physical activity and fitness settings, applying exercise prescriptions. Prereq: HNES 465 and HNES 465L. Coreq: HNES 472. Prereq or Coreq: Exercise Science major.

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 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. Prereq: HNES 190 and HNES 226. Prereq or Coreq: Sport Management majors only or with instructor permission. May be repeated for a total of 12 credits.

HNES 491. Seminar. 1-5 Credits.

HNES 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HNES 493. Undergraduate Research. 1-5 Credits.

HNES 494. Individual Study. 1-5 Credits.

HNES 496. Field Experience. 1-15 Credits.

HNES 499. Special Topics. 1-5 Credits.

HNES 601. Principles of Intercollegiate Athletics Administration. 3 Credits.
This course provides students with a comprehensive foundation concerning the administration of college sport. Students will learn about the different functions of intercollegiate athletics departments. Students will also examine contemporary issues related to intercollegiate athletics specifically, social, ethical, financial, economic, and management matters in college sport. Dual-listing: HNES 401.

HNES 604. 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. {Also offered for undergraduate credit - see HNES 404.}.

HNES 614. Global Perspectives in Sport. 3 Credits.
The impact of globalization trends on the sport industry. The course explores various theories of globalization as they relate to the business of sport. Prereq or Coreq: Enrolled in the Masters of Sport Management Program. Dual-listing: HNES 414.

HNES 615. The Olympic Games and Mega-Sporting Events. 3 Credits.
Students will examine the role of the Olympic Games and other mega-sporting events within the global sports industry. They will learn about the governance structures of international sport organizations and mega-sporting events as well as political, economic, social, and environmental implications for the future of mega-sporting events. Dual-listing: HNES 415.

HNES 616. Foundations in African Sport. 3 Credits.
This course provides a comprehensive examination of sport on the African continent, including historical, sociological, economic, cultural and political perspectives. Students will examine the different sport systems across the different regions on the African continent including how community and professional sport operate. Dual-listing: HNES 416.

HNES 617. Foundations in European Sport. 3 Credits.
This course provides a comprehensive examination of sport on the European continent, including historical, sociological, economic, cultural and political perspectives. Students will examine the different sport systems across the different regions in Europe, including the operation of community and professional sport. In addition, students will examine how the European sport system fits in the greater global sports industry. Dual-listing: HNES 417.

HNES 618. Foundations of Sport in Oceania. 3 Credits.
This course provides a comprehensive examination of sport in Oceania, including historical, sociological, economic, cultural and political perspectives. Students will examine the different sport systems across the different countries in Oceania, with an emphasis on the sport systems of Australia and New Zealand (Aotearoa). This examination includes the operation of community and professional sport. In addition, students will examine how the sport system of Oceania fits in the greater global sports industry. Dual-listing: HNES 418.

HNES 619. Foundations in Asian Sport. 3 Credits.
This course provides a comprehensive examination of sport on the Asian continent, including historical, sociological, economic, cultural, and political perspectives. Students will examine the different sport systems across the different regions in Asia including the operation of community and professional sport. In addition, students will examine how the Asian sport system fits in the greater global sports industry. Dual-listing: HNES 419.

HNES 621. Foundations of Sport in the Americas. 3 Credits.
This course provides a comprehensive examination of sport in North, Central and South America and the Caribbean, including historical, sociological, economic, cultural, and political perspectives. Students will examine the different sport systems across the different regions in the Americas including the operation of community and professional sport. In addition, students will examine how the American sport systems fit in the greater global sports industry. Prereq or Coreq: Restricted to Sport Management program or permission of instructor. Dual-listing: HNES 421.

HNES 625. Strategic Sport Marketing. 3 Credits.
This course provides a strategic framework to understand market dynamics, trends, consumer behavior, products, delivery systems, and marketing and promotional strategies that shape and drive the sports marketing industry. Prereq or Coreq: Enrollment in the Master's of Sport Management program or instructor permission. Dual-listing: HNES 425.

HNES 626. Foundations of Sport Management. 3 Credits.
The course is an in-depth analysis of the relationship of sport and management. The study of sport includes sporting goods manufacturers; fitness centers; recreation departments; broadcasting; Little League teams; and high school, NCAA, and professional leagues. The study of management follows the four functions of management: planning, organizing, leading, and controlling. Dual-listing: HNES 426.

HNES 642. Community Health and Nutrition Education. 3 Credits.
Nutrition education in community settings. Topics include behavior change, education and counseling theory, needs assessment, planning, implementation, and evaluation in a community setting. {Also offered for undergraduate credit - see HNES 442.}.

HNES 642L. Community Health and Nutrition Laboratory. 3 Credits.
Application of nutrition education and program development in community settings. Coreq: HNES 642. {Also offered for undergraduate credit - see HNES 442L.}.

HNES 644. Sport Finance. 3 Credits.
A study of economic and financial aspects as they relate to the sports industry. Examines revenue generation, budgeting, stadium funding, and franchise valuation, with a focus on the current challenges facing sports organizations at the pro, college, and local levels. Prereq or Coreq: Enrollment in the Master's of Sport Management program. Dual-listing: HNES 444.

HNES 652. Physical Health, Wellness, Nutrition and Active Aging. 3 Credits.
Normative biological and physiological changes due to aging are identified with a focus on how environmental factors such as physical activity and nutrition can support healthy aging and prevention of frailty and age-related diseases. Multiple facets of active aging that can augment quality of life will be examined. Resources for implementation of inclusive programs for diverse groups of aging adults will be explored.

HNES 655. Sports Nutrition. 3 Credits.
Provides both current research and the translation of research findings into practical advice, offering unique insights on how nutrition can be used to design and effectively implement the optimal diet for performance. {Also offered for undergraduate credit - see HNES 455.}.

HNES 658. Advanced Medical Nutrition Therapy. 3-4 Credits.
Principles in the nutrition care of patients with conditions requiring nutrition care. Prereq: HNES 354 Prereq or Coreq: Accelerated Coordinated Program In Nutrition Science and Dietetics Major. Dual-listing: HNES 458.

HNES 668. Foodservice Systems Management II. 1 Credit.
This course focuses on leadership, team-building, and professional communication in Nutrition Science & Dietetics. Leadership and communication theories will be applied to everyday practices to prepare participants to be successful leaders in the workforce. Dual-listing: HNES 468.

HNES 690. Graduate Seminar. 1-3 Credits.

HNES 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HNES 696. Special Topics. 1-5 Credits.

HNES 700. Research in Sport Management. 3 Credits.
This course is intended to prepare Sport Management students to conduct research in a variety of sport settings by discussing basic research designs and methods. Students will begin to develop topics, write research questions, and identify appropriate methods to answer the questions.

HNES 702. Introduction to Advanced AT and Professionalism. 1 Credit.
This course will include discussion of the expectations and responsibilities of the post-professional athletic trainer's transition into graduate school and as a professional healthcare provider. The content will be focused on information and tools to adjust to the new roles and responsibilities.

HNES 703. Graduate Biomechanics of Sport and Exercise. 3 Credits.
This course is designed to increase the knowledge and students understanding of the biomechanical principles behind training, sport, and physical activity.

HNES 704. Psychological Foundation of Sport & Physical Activity. 3 Credits.
Comprehensive description of sport psychology, application of concepts to sport performance improvements as well as other areas in physical activity.

HNES 707. Sport and Society. 3 Credits.
This course provides students with a better understanding of the relationship of sport to 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 713. Graduate Exercise Physiology. 3 Credits.
Comprehensive state-of-the-art review of the current knowledge of the physiological responses to exercise.

HNES 717. Nutrition Counseling and Education Methods. 3 Credits.
The course is designed to explore in-depth coverage of theories and skills required to be an effective nutrition educator for both groups and individuals in clinical and community settings, global settings and via social media. The course includes discussion and experience in applying learning theory, assessing educational needs, stating goals and objectives, selecting learning activities, and implementing and evaluating instruction. Prereq or Coreq: Students must be enrolled in the Great Plains IDEA Dietetics program.

HNES 718. Diabetes Medical Nutrition Therapy. 3 Credits.
An online study of diabetes management and nutrition care. Topics will include diabetes pathophysiology, clinical care guidelines, basic pharmacology, clinical nutrition education and counseling strategies, and nutrition care planning. Prereq or Coreq: Students must be enrolled in the Great Plains IDEA Dietetics program.

HNES 719. Public Health Nutrition. 3 Credits.
This course provides information and activities related to the broad topic of public health nutrition and will focus on how nutrition research, policies and programs impact populations. Students will gain a broader understanding of public health nutrition through case studies, discussions and experiential learning experiences.

HNES 720. Advanced Emergency Care. 3 Credits.
This course will introduce advanced emergency care techniques as well as reinforce basic knowledge already learned in previous course work. Certified Athletic Trainers are expected to perform life-saving measures and this course will develop the skills needed to treat athletes and lay public with evidence based medical care.

HNES 721. Nutrition Therapy for Eating Disorders. 3 Credits.
An online study of eating disorders management and nutrition care. Topics will include eating disorders medical complications, clinical care guidelines, basic pharmacology, clinical nutrition education, nutrition care planning, psychology of eating disorders, team collaboration, and therapeutic modalities for nutrition counseling. Prereq or Coreq: Students must be enrolled in the Great Plains IDEA Dietetics program.

HNES 722. Evidence Based Orthopedic Evaluation. 3 Credits.
This course will involve investigation, discussion, and reflection of the research on clinical orthopedic special tests to allow the student to implement evidence based clinical examinations.

HNES 723. Advanced Techniques in Sports Medicine. 3 Credits.
This course will review current research in the latest and most advanced techniques in sports medicine.

HNES 724. Nutrition Education. 3 Credits.
Principles and practices of teaching individuals and groups to translate nutrition knowledge into action. Emphasis on research in evaluation of nutrition education.

HNES 726. Nutrition in Wellness. 3 Credits.
Course will address wellness promotion through nutrition. Nutritional risk and protective factors will be examined as they relate to public health and individual nutrition.

HNES 727. Physical Activity Epidemiology. 3 Credits.
Review of the evidence on the associations between physical activity and chronic diseases, and effects of physical activity on health. Understanding and discussion regarding how the methods of epidemiology are being used to scientifically confirm that physical inactivity is a burden on public health and what can be done about it.

HNES 728. Current Issues & Trends in Dietetics Practice. 2 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 732. Foodservice Operation Management. 3 Credits.
In-depth analysis of several critical foodservice operations management decisions and development of analytical skills needed in solving operation management problems encountered in the foodservice industry.

HNES 733. Food Writing for Professionals. 3 Credits.
This course focuses on the writing skills needed by the food professional in order to communicate effectively in writing about food and food-related topics.

HNES 734. Foodservice Systems within Healthcare. 3 Credits.
A comprehensive review of today's health care institutions and their response to the economic, social/ethical, political/legal, technological, and ecological environments. Prereq: must be enrolled in the GPIDEA HNES: Option in Dietetics.

HNES 735. Nutrition and Human Performance. 3 Credits.
This course is designed for students to develop an understanding of nutrition based upon knowledge of the biochemical and physiological process and functions of specific nutrients in meeting nutritional requirements. The course emphasizes the relationship of optimal nutrition and physical efficiency and performance.

HNES 739. Sport Revenue Generation. 3 Credits.
This course is designed to examine means of maximizing revenue streams in and around the sport industry. As sport is a unique sector of the entertainment industry, managers are best suited to understand how to get the most out of the limited resources and partnership opportunities they have access to. This course will allow each student to focus on the sport context of their interest (e.g., youth sport, interscholastic sport, and collegiate athletics) in an effort to build a greater knowledge base on how to succeed and produce needed revenue streams in today's fast-paced and ever-changing sport environment. Major topics include the sport consumer, sport sponsorship, and the class will focus on researching and acquiring sponsors for a hypothetical event as decided by each student.

HNES 740. Maternal and Child Nutrition. 3 Credits.
Behavioral, physiological and public health issues impacting dietary and nutritional factors that support normal growth and development. Focuses on the early stages of the life cycle: gestation, lactation, infancy, preschool, school age and adolescence.

HNES 741. International Nutrition. 3 Credits.
Presents major nutritional problems that influence the health, survival, and developmental capacity of populations in developing societies. Covers approaches implemented at the household, community, national, and international levels to improve nutritional status.

HNES 742. Nutrition: A Focus on Life Stages. 3 Credits.
The influence of normal physiological stresses on nutritional needs throughout the life span will be explored. Evaluating nutritional status at different stages of life and identifying appropriate needs and services will be included.

HNES 743. Obesity Across the Lifespan. 3 Credits.
This course emphasizes obesity in a population from childhood to the adult with attention to the impact of obese conditions on disease development throughout the life cycle.

HNES 744. Dietary and Herbal Supplements. 3 Credits.
Explore the safety and efficacy of botanical/herbal and dietary supplements in health applications including dietary supplementation in the prevention and treatment of chronic illness.

HNES 745. Intercollegiate Sport Leadership. 3 Credits.
This course is intended to increase student awareness and understanding of contemporary issues related to leadership in intercollegiate sport. Including examination of different leadership styles and approaches that are used within different departments of college sport.

HNES 746. Nutrition and Health Disparities. 3 Credits.
This course is an examination of nutrition and health disparities in the U.S. Identification of sociocultural determinants of health and their influence on nutrition and health outcomes. Exploration of interdisciplinary strategies to reduce nutrition and health disparities.

HNES 747. Understanding Food Culture. 3 Credits.
This course is designed as a survey of topics that affect how we perceive food in the modern world. Food is examined as a badge of cultural identity, a focus of media scrutiny and promotion, a symbol of religion, and a driver of technology.

HNES 748. Nutritional Epidemiology. 3 Credits.
Methods and issues involved in understand and conducting studies on the relationship between human diet and disease. Recommended: graduate level statistics course.

HNES 749. Governance in College Sport. 3 Credits.
This course examines the regulations that are governing the college sports world in the United States and how intercollegiate sport organizations interact within the higher education system as well as the role of the NCAA in the regulation of college sport.

HNES 750. Advanced Human Nutrition: Macronutrients. 3 Credits.
Physiological and biochemical aspects of macronutrients of human nutrition.

HNES 751. Metabolism of Micronutrients. 3 Credits.
This course focuses on nutrition that integrates mechanisms and interactions of vitamins and minerals from the cellular level, through the integration and regulation of metabolism in the whole organism.

HNES 752. Phytochemicals. 3 Credits.
Overview of phytochemicals (non-nutritive biologically active compounds) from fruits, vegetables, cereals and oilseeds with implications related to chemistry, physiological functions, and potential health implications.

HNES 753. Nutrigenomics and Advanced Lipid Metabolism in Human Nutrition. 3 Credits.
Concepts of how nutrients regulate gene expression (nutrigenomics) and how an individual's genotype influences their nutrient requirements (nutrigenetics). This course will focus on the unique role of lipids in nutritional genomics and chronic disease. Students must be enrolled in the M.S. in Dietetics program (GPIDEA).

HNES 754. Assessment in Nutrition and Exercise Science. 3 Credits.
Techniques to assess nutritional status, physical fitness status and how to interpret the information received.

HNES 756. Pediatric Clinical Nutrition. 3 Credits.
The physiological, biochemical and nutritional aspects of disease processes relevant to infants and children up to 18 years of age, including inborn errors of metabolism, food hypersensitivity, obesity, and diseases of the major organ systems. Prereq: HNES 755.

HNES 757. Nutritional Aspects of Oncology. 3 Credits.
Basic cancer biology and the relationship between nutrition and cancer, the role of nutrition in specific cancers, and information for cancer prevention programs and how to apply this information in patient management.

HNES 758. Clinical Aspects of Nutrition Support. 3 Credits.
Specialized nutrition assessment and support. Review of energy expenditure and substrate utilization in disease states. Methods for the initiation and management of enteral and parenteral nutrition therapy. Evaluation of nutrition support selected disease states.

HNES 759. Nutrition and Immunology. 3 Credits.
Principles and issues related to nutrition and immunology. Impact of nutrients and nutritional status on immune responses. Impact of disease states on nutritional status.

HNES 760. Skeletal Muscle Physiology. 3 Credits.
This course is designed to provide students with an in-depth analysis of the structure and function of skeletal muscle. Course material ranges from skeletal muscle microanatomy and physiology to advanced topics in neuromuscular physiology.

HNES 761. Physiological and Fitness Assessment in Exercise Science. 3 Credits.
Instruction and practical guidelines of different physiological and fitness assessments in exercise science.

HNES 762. Exercise Endocrinology. 3 Credits.
A comprehensive review of the endocrine system with a specific emphasis on the hormonal response to exercise. Prerequisite: MS or PhD level students only.

HNES 764. Advanced Cardiovascular Exercise Physiology. 3 Credits.
This course will focus on understanding the structure and function of the cardiovascular system and the effects of exercise on the system.

HNES 765. Orthopedic Appliances. 3 Credits.
Application of common casting and bracing techniques.

HNES 768. Socio-cultural and Ethical Issues in Intercollegiate Sport. 3 Credits.
This course provides students the opportunity to examine critical current issues in intercollegiate athletics, specifically, examining social, cultural, and ethical issues including academic fraud, name, image and likeness rights, student-athlete mental health, and diversity, equity, and inclusion.

HNES 769. Human Resource Management In Sport. 3 Credits.
It is critical to effectively manage human resources in the sport industry in order to maximize the success of the sport and recreation organizations. This course will cover both theoretical and current practices involved in the fundamentals of managing individuals and groups in organizations.

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 771. Sport and the Media. 3 Credits.
In this course, students will examine the intersection of mass media and sport. Students will develop an understanding of the operation of different methods of sports media across all levels of sports. Students will examine new and emerging media technologies and their use with the sports industry.

HNES 772. Prevention and Health Promotion in Athletic Training. 2 Credits.
General nutrition, prevention and health promotion concepts, and psychosocial and mental health aspects in athletic training. Prereq: HNES 770.

HNES 773. Athletic Training Capstone. 2 Credits.
Comprehensive review of patient case scenarios using evidence-based practice for clinical integration as a healthcare professional. Prereq: HNES 774, HNES 776.

HNES 774. Therapeutic Exercise. 3 Credits.
Therapeutic interventions involving rehabilitative techniques, equipment, and activities using body movements to enhance function, prevent impairments and activity restrictions to maximize participation and health-related quality of life.. Prereq: HNES 782.

HNES 775. Therapeutic Modalities. 3 Credits.
Therapeutic interventions involving contemporary modalities to prevent and treat orthopedic injuries to restore and enhance function and maximize participation and health-related quality of life. Prereq: HNES 770.

HNES 776. Non-Orthopedic Assessment. 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. 4 Credits.
Clinical evaluation and diagnosis of the lower extremity. Prereq: HNES 780.

HNES 782. Orthopedic Assessment II. 5 Credits.
Clinical evaluation and diagnosis of the upper extremity, head, and spine. Prereq: HNES 781.

HNES 786. Diagnostic Ultrasound - Shoulder and Knee Basics. 3 Credits.
This course will introduce students to the normal tissue characteristics, common pathology characteristics and shoulder and knee evaluation protocols with musculoskeletal ultrasound.

HNES 787. Evidence Based Therapeutic Modalities. 3 Credits.
An advanced comprehensive examination of therapeutic modalities through readings, discussions, hands-on practice, and research. Emphasis will be on the current literature, how recent research fits into clinical practice, and new modalities/techniques.

HNES 788. Diagnostic Ultrasound - Case Studies and Ankle Basics. 3 Credits.
This course will introduce students to the normal tissue characteristics and common pathology characteristics of the ankle evaluation protocol with musculoskeletal ultrasound. In addition, students will perform shoulder, knee and ankle evaluations on patients in the clinical setting (NDSU Athletic Training Room) to practice their diagnostic ultrasound examination skills and have a better understanding of common pathologies.

HNES 790. Graduate Seminar. 1-3 Credits.

HNES 791. Temporary/Trial Topics. 1-5 Credits.

HNES 792. Graduate Teaching Experience. 1-6 Credits.

HNES 793. Individual Study. 1-5 Credits.

HNES 794. Practicum/Internship. 1-15 Credits.

HNES 795. Field Experience. 1-15 Credits.

HNES 796. Special Topics. 1-5 Credits.

HNES 797. Master's Paper. 1-3 Credits.

HNES 798. Master's Thesis. 1-10 Credits.

HNES 892. Graduate Teaching Experience. 1-6 Credits.

HNES 893. Individual Study/Tutorial. 1-5 Credits.

HNES 894. Practicum/Internship. 1-8 Credits.

HNES 899. Doctoral Dissertation. 1-15 Credits.

Health, Physical Education and Recreation (HPER)

HPER 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.

HPER 112. Activity II. 1 Credit.
Basic techniques and practice of individual and dual sports activities. May be repeated in different activities/subjects only.

HPER 114. Racquetball. 1 Credit.
Basic techniques and practice of racquetball.

HPER 115. Bowling. 1 Credit.
Basic techniques and practice of bowling.

HPER 116. Billiards. 1 Credit.
Basic technique and practice of billiards.

HPER 117. Judo. 1 Credit.
Basic techniques and practice of judo.

HPER 124. Rugby. 1 Credit.
Students who first take this class will learn the basic principles, rules, and practice of rugby. Students who repeat this class will build upon their foundation to become more advanced and proficient with the nuance of the sport. All students will complete a semester goals assignment/assessment and an activity from their Rugby Portfolio. Students may not repeat a Rugby Portfolio activity from a previous semester. May be repeated for credit.

HPER 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.

HPER 128. Golf. 1 Credit.
Basic technique and practice of golf.

HPER 130. Rock Climbing. 1 Credit.
Basic technique and practice of rock climbing.

HPER 131. Yoga. 1 Credit.
Students who first take this class will learn the basic principles and practices of Yoga. Students who repeat this class will build upon their foundation to become more advanced and proficient with the nuance of Yoga. All students will complete a semester goals assignment/assessment and an activity from their Yoga Portfolio. Students may not repeat a Yoga Portfolio activity from a previous semester. May be repeated for credit.

HPER 133. Volleyball. 1 Credit.
In this course you will learn the basic principles, rules and practice of volleyball.

HPER 134. Basketball. 1 Credit.
Basic technique and practice of basketball.

HPER 135. Badminton. 1 Credit.
Basic technique and practice of badminton.

HPER 139. Dodgeball. 1 Credit.
Basic technique and practice of dodgeball.

HPER 148. Team Sports. 1 Credit.
Basic principles, rules, and practices of various team sports.

HPER 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.

HPER 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.

HPER 231. Officiating Football. 1 Credit.
Rules and techniques of officiating football.

HPER 232. Officiating Basketball. 1 Credit.
Rules and techniques of officiating basketball.

HPER 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: Physical Education major or Pre-Physical Education major.

HPER 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: Physical Education major or Pre-Physical Education major.

HPER 256. Professional Preparation in High School Physical Education. 3 Credits.
Instruction in the fundamentals of teaching high school physical education activities. Co-req: HPER 254.

HPER 257. Professional Preparation in Elementary School Activities. 3 Credits.
Instruction of various fundamental movements for elementary aged students. Students will be exposed to such activities as dance, gymnastics, fundamental movement skills, and games. Prereq: HPER 254.

HPER 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: Physical Education major or Pre-Physical Education major and Junior standing.

HPER 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: Physical Education major or Pre-Physical Education major and junior standing or instructor permission.

HPER 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: Health Education or Pre-Health Education major and sophomore standing.

HPER 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: Health Education or Pre-Health Education major and junior standing.

HPER 349. Advanced Coaching. 3 Credits.
Provides advanced coaching information including practice and season planning, talent analysis and development, scouting, game preparation, and game execution. Prereq: HPER 336.

HPER 350. Fitness Education Activities and Materials. 3 Credits.
Topics related to teaching concepts-based fitness in high school physical education. Prereq: HNES 254.

HPER 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: Physical Education or Pre-Physical Education major and junior standing.

HPER 367. Pedagogy of the Body for K-12. 3 Credits.
Application of principles and techniques for teaching K-12 physical education standards related to physical conditioning. Prereq: Physical Education major, Pre-Physical Education major, Health Education major, or Pre-Health Education major and junior standing.

HPER 445. Organization and Administration of Coordinated School Health Programs. 3 Credits.
Examination of coordinated school health programs (CSHP). Analysis of the components of and approaches to development of CSHP. Emphasis on skills required for entry-level health educators. Prereq: HNES 345, senior standing. (Also available for graduate credit - See HNES 645.}.

HPER 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. Coreq: EDUC 481.

HPER 484. Coaching and Physical Activity Leadership Internship. 1-12 Credits.
This course provides comprehensive learning experiences in sport coaching and physical activity leadership. It includes 43 hours per credit of on-site work experience with approved organizations and may be repeated for a total of 12 credits. May be repeated for credit. Prereq: HPER 255. Prereq or Coreq: Must be a Physical Education major and have instructor permission.

HPER 491. Seminar. 1-5 Credits.

HPER 494. Individual Study. 1-5 Credits.

HPER 496. Field Experience. 1-15 Credits.

HPER 645. Organization and Administration of Coordinated School Health Programs. 3 Credits.
Examination of coordinated school health programs (CSHP). Analysis of the components of and approaches to development of CSHP. Emphasis on skills required for entry-level health educators. Dual-listing: HPER 445.

HPER 700. Research in Physical Education and Sport Coaching. 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. Prereq or Coreq: Must be enrolled in the LPESC program or have instructor permission.

HPER 701. Leadership and Supervision in Physical Education and Sport Coaching. 3 Credits.
This course provides an introduction to leadership and supervision in physical education and sport settings. The course is designed to provide students with skills, techniques, and practices for successful leadership and supervision. Prereq or Coreq: Must be enrolled in the LPESC program or have instructor permission.

HPER 704. Psychology of Sport and Physical Activity. 3 Credits.
This course is designed to increase the knowledge of the student's understanding of the principles behind sport psychology. The student will have the opportunity to create and apply some of the concepts and techniques to sports as well as other areas of life outside of sports. Prereq or Coreq: Must be enrolled in the LPESC program or have instructor permission.

HPER 705. Content Development and Instructional Practices in Physical Education and Coaching. 3 Credits.
Content development and appropriate instructional practices within physical education and coaching settings with an emphasis on skill and strategy analysis. Prereq or Coreq: Must be enrolled in the LPESC program or have instructor permission.

HPER 707. Social Issues in Sport, Physical Activity and Coaching. 3 Credits.
This course examines the intersection of sport and American society. Implications of a variety of issues in youth, college, and professional sport structures and teaching contexts will be discussed, including social class, race, and gender-based social issues. Prereq: Must be enrolled in either the LPESC or have instructor permission.

HPER 708. Positive Youth Development in Physical Activity and Sport. 3 Credits.
This course explores the numerous ways in which participating in sport and physical activity can be beneficial for children and young people. Historical and theoretical contexts of positive youth development will be discussed, in addition to the potential of positive youth development in sport across different ages and abilities. Prereq or Coreq: Must be enrolled in either the LPESC or have instructor permission.

HPER 709. Laws of Leadership in Physical Education and Sport Coaching. 3 Credits.
This course is intended to increase student awareness and understanding of contemporary issues related to leadership in physical education teaching and sport coaching. Prereq or Coreq: Must be enrolled in the LPESC program or have instructor permission.

HPER 711. Physical Education Curriculum. 3 Credits.
This course aims to develop 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 familiarizes students with various ideas in physical education curriculum design. Prereq or Coreq: Must be enrolled in the LPESC program or have instructor permission.

HPER 712. Principles of Management in Physical Education and Coaching Settings. 3 Credits.
This course is designed to study the principles of management within teaching, coaching, and associated professional organizations. Students will develop a comprehensive foundation of management skills and apply these skills across these settings. Prereq or Coreq: Must be enrolled in the LPESC program or have instructor permission.

HPER 714. Legal Liability in Health, Physical Education, & Recreation. 3 Credits.
This course focuses on risk management and legal liability in health, physical education, and recreation (HPER). Overview of civil and criminal law as it relates to these areas is addressed. Prereq or Coreq: Must be enrolled in the LPESC program or have instructor permission.

HPER 715. Teaching Concepts-Based Fitness. 3 Credits.
This course will cover topics directly related to the teaching of concepts-based health-related fitness in K-12 physical education. The overall aim is to help students have a better theoretical and practical understanding of the role of fitness education in contemporary physical education. The main goal of this course is to prepare students to teach concepts-based health-related components to students in a school setting. Prereq: Must be enrolled in the LPESC program or have instructor permission.

HPER 731. Governance in Sport Coaching. 3 Credits.
This course examines how high school, recreational, and youth sport organizations interact and coordinate with numerous policy actors from inside and outside the sport coaching realm to facilitate and coordinate the mechanisms of governance. The transition from high school to collegiate sports and collegiate to professional for some players will be explored as well. Prereq: Must be enrolled in the LPESC program or have instructor permission.

HPER 736. Ethical Leadership in Coaching Sports. 3 Credits.
This course examines the various ethical situations coaches encounter within organizations and with other coaches and athletes. Students will gain an understanding of the ethical dimensions of sport and develop strategies to facilitate ethical coaching practices and encourage athletes to recognize and understand the importance of ethics in sport. Prereq or Coreq: Must be enrolled in the LPESC program or have instructor permission.

HPER 737. School-wide Physical Activity Promotion. 3 Credits.
Assessment, planning, and evaluation of physical activity programming within the K-12 setting. Understanding and implementation of school-wide physical activity program models and resources. Physical activity advocacy and stakeholder engagement strategies within K-12 physical activity programs. Prereq or Coreq: Must be enrolled in either the LPESC or Whole Child Approaches program or have instructor permission.

HPER 738. Adapted Physical Education. 3 Credits.
This course provides an overview of the etiological, physical, and psychological considerations of disabilities in education settings. This course contains methods of adapting activities in physical education for individuals with disabilities. Prereq or Coreq: Must be enrolled in the LPESC program or have instructor permission.

HPER 739. SEL via the Adventure Education Instructional Model. 3 Credits.
The Adventure Education instructional model fosters learning through hands-on experiences and is framed by reflection and analysis. This course includes: a) a review of social-emotional learning (SEL) frameworks; b) an introduction to the Adventure Education instructional model; and c) strategies for facilitating SEL through Adventure Education experiences. Professionals will learn a variety of activities and debriefing strategies to promote SEL learning in their classrooms and other appropriate settings (before/after school programs, sports teams, etc.) This course is most applicable to those who teach or work with elementary (2nd grade and up), middle, and/or high school students. Prereq: Must be enrolled in the LPESC program or have instructor permission.

HPER 745. Organization and Administration of Coordinated School Health Programs. 3 Credits.
Examination of coordinated school health programs (CSHPs). Analysis of the components of and approaches to development of CSHPs. Emphasis on skills required of teachers and administrators implementing the Whole School, Whole Community, Whole Child (WSCC) model. Prereq or Coreq: Must be enrolled in either the LPESC or Whole Child Approaches program or have instructor permission.

HPER 790. Graduate Seminar. 1-3 Credits.

HPER 795. Field Experience. 1-15 Credits.

History (HIST)

HIST 100. Past and Present. 3 Credits.
This course introduces students to the historical foundations of modern life. Topics vary year to year but may include the roots of modern conflicts, the historical context of American and global politics, the origins of the modern economy, and the histories of marginalized groups in America and elsewhere.

HIST 101. Western Civilization I. 3 Credits.
Introductory survey of Western Civilization from prehistory to 1648, emphasizing major political, social, cultural, and intellectual developments.

HIST 102. Western Civilization II. 3 Credits.
Introductory survey of Western Civilization from 1648 to the present, emphasizing major political, social, cultural, and intellectual developments.

HIST 103. U.S. to 1877. 3 Credits.
This course explores key events, trends, and concepts in American history from before European contact until the Civil War. Through readings, lectures, and discussion, students will engage with the social, economic, political, and cultural factors at play in the development of the United States to 1865. The course will examine the motivations and effects of European colonization in North America; the causes of the American Revolution and its political, social, and cultural ramifications; the growth of market capitalism and its effects on American society; the course and nature of westward expansion during the nineteenth century; and the emergence, expansion, and eventual end of slavery in the United States.

HIST 104. U.S. Since 1877. 3 Credits.
Survey of United States history since 1877, emphasizing major political, economic, social, and cultural developments.

HIST 111. History and Morality of War. 3 Credits.
An interdisciplinary - History and Philosophy/Ethics - investigation into the history and morality of war, including the creation of empires, the birth of total war, the nuclear arms race, genocide, women and war, the environment, terrorism, pacifism, and the ethical declaration and fighting of wars.

HIST 130. The American Presidency. 3 Credits.
This course explores the role of the presidency in American history from 1776 to the present. Themes explored include the origins of the office and changing interpretations of the role of the national executive; how the presidency has fit in among other branches of the US government; the execution of presidential leadership during national crises; and the recurring controversies associated with the power of presidents.

HIST 135. Race in U.S. History. 3 Credits.
The historical development of racism and racial ideas and the interactions among Native Americans, European-Americans, and groups of various races from pre-contact to the present.

HIST 140. History of the Holocaust. 3 Credits.
This course is a study of the Holocaust, also known as the Shoah, set in its European context. Considerable attention will be given to the Holocaust's causes, its interconnected international elements and processes, and its position and role at the heart of World War II in Europe.

HIST 175. Pirates of the Caribbean. 3 Credits.
History of piracy in the Early Modern Caribbean and other zones of European influence (ca. 1500-1750), with particular attention to the geopolitical developments shaping its rise and fall.

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 240. "Cults" and New Religious Movements. 3 Credits.
This course examines the creation and sustainability of new religious movements, including Scientology, Jehovah's Witness, Aum Shinrikyo, Peoples Temple, and the Church of Jesus Christ of Latter-day Saints, and the history of anti-cult movements. Cross-listed with RELS.

HIST 251. Introduction To Public History. 3 Credits.
Introduction to history career paths outside of the classroom including museums, historical societies, historic preservation, and historic sites.

HIST 252. Introduction to Museum Work. 3 Credits.
Introduction to the variety of careers available and procedures used in museums and historical societies: curatorial, administrative, conservation, research, and educational. Prereq: HIST 251.

HIST 259. Women in European History 1400-1800. 3 Credits.
Exploration of what it meant to be female in early modern Europe: women's options, how women saw themselves, how they were perceived, and origins of these perceptions.

HIST 270. American Religious History. 3 Credits.
Introduction to the basic issues in American history including the study of Puritans, immigration, church and state, revivalism, civil and military religion, apocalypticism, and new age religion. Cross-listed with RELS 270.

HIST 271. Introduction to Latin American History. 3 Credits.
Study of important social, economic, and cultural developments in Latin American history. Emphasizes the socio-economic and cultural topical developments and the political and international factors influencing the region.

HIST 280. History of East Asia to 1600. 3 Credits.
The history of East Asia to 1600, focusing on the political, economic, and cultural phenomena critical to the development of traditional China, Japan, and Korea.

HIST 281. History of East Asia from 1600. 3 Credits.
The history of modern East Asia from 1600 to the present, focusing on the political, economic, and cultural phenomena critical to the development of modern China, Japan, and Korea.

HIST 291. Seminar. 1-5 Credits.

HIST 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HIST 294. Individual Study. 1-5 Credits.

HIST 299. Special Topics. 1-5 Credits.

HIST 311. History of Technology. 3 Credits.
This course examines how technology and new technological innovations have played a fundamental role in the development of modern modes of transportation, communication, health, economics, and government, thereby shaping global history. Cross-listed with ENGR 311.

HIST 320. History of Christianity. 3 Credits.
A study of Christianity's formation, the rise of the Catholic Church, Eastern Christianity, the Reformation, monasticism, Pentecostalism, liberation theology, and global missions. Cross-listed with RELS 320.

HIST 328. War and Society in America. 3 Credits.
This course examines the changes that military conflict has wrought on American society from the colonial era through the War on Terror. Among other topics, readings and discussions will consider the effects of war on gender roles, ideas of racial difference, social and economic organization, politics, and America's relationship to the rest of the world.

HIST 345. Church and State in America. 3 Credits.
Study the entanglements of religion and the state in America, including its impacts on religious liberty, gender, sexuality, race, foreign relations, and religious nationalism. Cross-listed with RELS 345.

HIST 352. Museum Collections Management. 3 Credits.
This course focuses on the fundamental principles of museum collections management, registration, and preservation issues in museums through lectures, hands-on practice, and field trips. Prereq: HIST 251.

HIST 354. The United States in the Long 1960s. 3 Credits.
This course examines the major social, cultural, economic, and political changes within American society and the United States from 1956 to 1974.

HIST 355. Global Islam. 3 Credits.
Examination of the foundational history, texts, laws, and rituals of Islam, in addition to the lived experience of Islam and related political dynamics in the Middle East, Europe, Asia, Africa, and North America. Cross-listed with RELS 355.

HIST 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

HIST 381. Australia & New Zealand. 3 Credits.
Comprehensive, but not exhaustive, historical comparison of Australia and New Zealand with emphasis on formation of national identity(ies). Organized topically to facilitate comparisons.

HIST 390. Historical Research and Writing. 3 Credits.
Techniques and skills of historical research and writing. Includes researching in libraries and archives, constructing thesis statements, outlining papers, building logical arguments, writing clear and concise English, using primary sources, footnoting, and copyediting. Prereq: ENGL 120, junior standing.

HIST 391. Seminar. 1-5 Credits.

HIST 392. Global Practicum: Study Abroad. 1-3 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HIST 394. Individual Study. 1-5 Credits.

HIST 396. Field Experience. 1-15 Credits.

HIST 399. Special Topics. 1-5 Credits.

HIST 401. Archival Theory and Practice. 3 Credits.
Archival theory and its practical application in supervised projects utilizing the resources of the Institute for Regional Studies and University Archives. {Also offered for graduate credit - see HIST 601.}.

HIST 403. Archival Preservation. 3 Credits.
This course examines the history, theory and practice of archival preservation, which includes the preservation of manuscripts, photographs, audio-visual and electronic records. Prereq: HIST 251. {Also offered for graduate credit - see HIST 603.}.

HIST 404. Digital History. 3 Credits.
This course will focus on creating digital history, and incorporate readings, discussion, digital fundamentals, creative thinking, and hands-on-learning in a collaborative environment and develop a project based on local history resources. Prereq: at least junior standing. {Also offered at the graduate level - HIST 604}.

HIST 415. Public Memory and Memorialization in America. 3 Credits.
This course examines the construction of public memory and the culture of memorialization in the United States from its earliest years to the present. Among other topics, we will consider how public memory is created, how it changes over time, and how historical and modern-day monuments and memorials came to be constructed.

HIST 420. Colonial American History. 3 Credits.
American history from the Pre-Columbian period through 1763. {Also offered for graduate credit - see HIST 620.}.

HIST 421. Revolutionary America. 3 Credits.
This course examines the causes, process, and effects of the American Revolution from roughly 1763 through 1829. Among other topics, lectures and readings will consider how British authority collapsed, the ideological and economic origins of republicanism, the effects of the Revolution on social, racial, and gender hierarchies, the contested creation of a new republic in its wake, and the economic and social development of the United States in its formative decades. {Also offered for graduate credit - see HIST 621.}.

HIST 422. American Civil War and Reconstruction. 3 Credits.
Political, social, and economic history of the United States 1829-1877; emphasizing socioeconomic change, the Sectional Crisis, the Civil War, and Reconstruction. {Also offered for graduate credit - see HIST 622.}.

HIST 423. The Gilded Age and Progressive America. 3 Credits.
Political, social, and economic history of the United States 1877-1917; emphasizing industrialization, urbanization, and progressive reform. {Also offered for graduate credit - see HIST 623.}.

HIST 424. U.S. History 1917-1960. 3 Credits.
This course covers the political, social, and economic history of the United States from 1917-1960, emphasizing World War I, 1920s, the Great Depression, New Deal, and the early Cold War era. {Also offered for graduate credit - see HIST 624.}.

HIST 425. U.S. History 1917-Present II. 3 Credits.
Political, social, diplomatic, and economic history of the United States since 1960; emphasizing foreign policy, domestic developments, and socioeconomic change. {Also offered for graduate credit - see HIST 625.}.

HIST 426. Women in American History. 3 Credits.
A survey of political, social, economic, and cultural development of American women from colonial times to the present with a focus on the lived experiences of diverse groups of women. Central themes are: the incongruity of ideal and reality, the fluidity of gender expectations and the "public" sphere, women's ability to navigate different power structures successfully, work and sexual division of labor, and the role of family and personal life. Cross-listed with WGS 426. Dual-listing: HIST 626.

HIST 430. Prairie Earth, Prairie Homes: A Field School. 3 Credits.
Exploration, investigation, and restoration of earth buildings on the northern plains. Students study the cultures that created earth buildings; encounter the buildings as cultural artifacts; and engage in hands-on restoration work. Prereq: Junior standing. {Also offered for graduate credit - see HIST 630.}.

HIST 431. The North American Plains. 3 Credits.
Historical treatment of the Great Plains of North America as an international region, comprising the Canadian prairies and the American plains. {Also offered for graduate credit - see HIST 631.}.

HIST 434. Environmental History. 3 Credits.
Traces the changing relationship between human cultures and the natural world through time, mainly in North America. Examines the causes and consequences of major changes to landscapes and plant and animal species and ecosystems, analyzes the emergence of the conservation and environmental movements, identifies shifts in environmental thought, and traces the development of environmental laws and policies. {Also offered for graduate credit - see HIST 634.}.

HIST 435. World Environmental History. 3 Credits.
The course examines the relationship between peoples and their environment over time in selected areas of the world. It focuses on the past two thousand years from the Roman Empire to the present. {Also offered for graduate credit - see HIST 635.}.

HIST 436. American Frontier to 1850. 3 Credits.
Early American frontier from 1500's to mid-1800's, emphasizing Indian-White relations, colonial wars, social life in the backcountry, and exploration and settlement. {Also offered for graduate credit - see HIST 636.}.

HIST 438. Historical Archaeology. 3 Credits.
Examines the development, methods, and research themes of historical archaeology. Cross-listed with ANTH 438. Dual-listing: ANTH 638 and HIST 638.

HIST 440. The Ottoman Empire. 3 Credits.
This course examines the growth of the Ottoman Empire after 1300 and then analyzes its responses to a variety of challenges after 1683. We examine Balkan states such as Greece and Serbia, Arab lands such as Iraq and Egypt, and Turkey itself. Topics examined include the role of Islam in Ottoman administration, the rights of religious minorities such as Christians and Jews, and the evolution of Arab nationalism. {Also offered for graduate credit - see HIST 640.}.

HIST 449. Ancient Rome: From Republic to Empire. 3 Credits.
This course offers an introduction to the history of the Roman Republic and Empire, beginning with the legendary founding of the city in 753BC and ending with the Julio-Claudian dynasty. We will focus especially on the transition from the Republic to Empire, that is the dissolution of the Republic and the rise of one-man's rule.

HIST 450. Ancient History. 3 Credits.
Cultural, political, economic, and social history of the ancient Near East, Greece, and Rome. {Also offered for graduate credit - see HIST 650.}.

HIST 451. Medieval History. 3 Credits.
Cultural, political, economic, and social history of the Middle Ages. {Also offered for graduate credit - see HIST 651.}.

HIST 452. The Viking Age. 3 Credits.
This course offers an intensive look at the Scandinavian peoples of Europe in the central Middle Ages, between AD 750 and 1100. While it is true that for nearly three centuries, Viking pirates ravaged the coasts of Europe and terrorized European Christians, these feared Norsemen were also traders and intrepid explorers, who established a network of connections that stretched from North America to Baghdad and who developed a complex society and culture. It is their achievements, political, cultural and religious, that this class seeks to illumine. {Also offered for graduate credit - see HIST 652.}.

HIST 454. Renaissance And Reformation. 3 Credits.
Political, social, and economic history of continental Europe from 1400 to 1650; with a focus on Renaissance and Reformation. {Also offered for graduate credit - see HIST 654.}.

HIST 456. Europe 1815-1914. 3 Credits.
Political, social, and economic history of Europe from the defeat of Napoleon to outbreak of World War I. {Also offered for graduate credit - see HIST 656.}.

HIST 457. Europe Since 1914. 3 Credits.
Political, social, and economic history of Europe including World War I, the Russian Revolution, Nazism, World War II, and the postwar era. {Also offered for graduate credit - see HIST 657.}.

HIST 464. Imperial Spain. 3 Credits.
The history of Spain as a global imperial power, beginning with the marriage of Ferdinand and Isabella in 1469 and concluding with the Latin American wars for independence in the early nineteenth century. {Also offered for graduate credit - see HIST 664.}.

HIST 465. Germany since 1750. 3 Credits.
This course traces the evolution of the main German-speaking regions of Europe into modern, industrialized nation-states. From the time of Bach to the fall of the Berlin Wall and beyond, we analyze key trends and events in the politics, society, and culture of Prussia, Imperial Germany, the Weimar Republic, Austria, the Nazi dictatorship, East and West Germany, and the expanded Federal Republic after 1989. {Also offered for graduate credit - see HIST 665.}.

HIST 466. History Of Russia I. 3 Credits.
Cultural, diplomatic, intellectual and political history of Russia; evolution of the Russian state, expansion of Imperial Russia, Great Reforms, populism, and socialism.

HIST 467. History Of Russia II. 3 Credits.
Cultural, diplomatic, intellectual, and political history of Russia and the Soviet Union; agriculture, industry, Marxism in Russia, revolution of 1905 and 1917, and the Soviet Union from Lenin to present. {Also offered for graduate credit - see HIST 667.}.

HIST 473. Colonial Mexico. 3 Credits.
Study of the important social, economic, political, and cultural developments in Mexican history from the pre-Columbian epoch through the wars for independence, ending in 1821. {Also offered for graduate credit - see HIST 673.}.

HIST 474. Modern Mexico. 3 Credits.
Study of the important social, economic, political, and cultural developments in Mexican history from independence in 1821 through the contemporary era. {Also offered for graduate credit - see HIST 674.}.

HIST 475. The Aztec, Maya, and Inca. 3 Credits.
The history of native peoples in Latin America, including the Aztec, Maya, and Inca, from the pre-Columbian era to the present day. {Also offered for graduate credit - see HIST 675.}.

HIST 477. Slavery in the Atlantic World. 3 Credits.
This course examines the social, economic, political, and cultural aspects of the history of slavery in the Atlantic world from the 1400s to 1888 with an emphasis on Brazil and the Caribbean. {Also offered for graduate credit - see HIST 677.}.

HIST 479. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

HIST 480. History of Modern China from 1600. 3 Credits.
The history of modern China from 1600 to the present focusing on the expansion of China's empire, confrontation with the West, and the dramatic political and social changes of the 20th century.

HIST 481. History of Japan. 3 Credits.
This course surveys the history of Japan from its myths of creation to the present, focusing on the development of traditional Japanese culture, the rise of the samurai, Japan's response to the West, and the militarization and modernization of Japan during the 20th century.

HIST 482. Vietnam: 125 Years of Conflict. 3 Credits.
The history of Vietnam from the 1850s to the present focusing on French colonial rule, American involvement in the region, revolutionary warfare, and Vietnam's emergence as an autonomous, independent state.

HIST 484. Cultures and Civilizations of the Pre-modern World. 3 Credits.
This course examines the history of human societies in the pre-modern world until 1500, focusing particularly upon the cultural, social, economic and intellectual developments catalyzed by the rise and evolution of civilizations across the globe.

HIST 485. Cultural Exchange and the Making of the Modern World. 3 Credits.
This course examines the globalization of the modern world since 1200, focusing particularly upon the cultural, social, economic and biological exchanges catalyzed by exploration, colonialism, and 19th and 20th century Diasporas.

HIST 486. Plague! Tragedies and Triumphs of Globalization. 3 Credits.
This course examines how, from the Middle Ages to the present, infectious diseases have played a fundamental role in the development of modern modes of economics and government, public health, and modern technologies, thereby shaping global history. {Also offered for graduate credit - See HIST 686.}.

HIST 489. Senior Seminar. 3 Credits.
Capstone experience focused on understanding major concepts and applying knowledge of basic methods and problems. Students evaluate secondary literature, conduct primary research, and master standard forms of historical writing. Prereq: HIST 390.

HIST 491. Seminar. 1-5 Credits.

HIST 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HIST 493. Undergraduate Research. 1-5 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}.

HIST 615. Public Memory and Memorialization in America. 3 Credits.
This course examines the construction of public memory and the culture of memorialization in the United States from its earliest years to the present. Among other topics, we will consider how public memory is created, how it changes over time, and how historical and modern-day monuments and memorials came to be constructed.

HIST 620. Colonial American History. 3 Credits.
American history from the Pre-Columbian period through 1763. {Also offered for undergraduate credit - see HIST 420.}.

HIST 621. Revolutionary America. 3 Credits.
This course examines the causes, process, and effects of the American Revolution from roughly 1763 through 1829. Among other topics, lectures and readings will consider how British authority collapsed, the ideological and economic origins of republicanism, the effects of the Revolution on social, racial, and gender hierarchies, the contested creation of a new republic in its wake, and the economic and social development of the United States in its formative decades. {Also offered for undergraduate credit - see HIST 421.}.

HIST 622. American Civil War and Reconstruction. 3 Credits.
Political, social, and economic history of the United States 1829-1877; emphasizing socioeconomic change, the Sectional Crisis, the Civil War, and Reconstruction. {Also offered for undergraduate credit - see HIST 422.}.

HIST 623. The Gilded Age and Progressive America. 3 Credits.
Political, social, and economic history of the United States 1877-1917; emphasizing industrialization, urbanization, and progressive reform. {Also offered for undergraduate credit - see HIST 423.}.

HIST 624. U.S. History 1917-1960. 3 Credits.
Political, social, and economic history of the United States 1917-1960; emphasizing the New Deal, the world wars, and the Cold War era. {Also offered for undergraduate credit - see HIST 424.}.

HIST 625. U.S. History 1917-Present II. 3 Credits.
Political, social, diplomatic, and economic history of the United States since 1960; emphasizing foreign policy, domestic developments, and socioeconomic change. {Also offered for undergraduate credit - see HIST 425.}.

HIST 626. Women in American History. 3 Credits.
A survey of political, social, economic, and cultural development of American women from colonial times to the present with a focus on the lived experiences of diverse groups of women. Central themes are: the incongruity of ideal and reality, the fluidity of gender expectations and the "public" sphere, women's ability to navigate different power structures successfully, work and sexual division of labor, and the role of family and personal life. Cross-listed with WGS 626. Dual-listing: HIST 426.

HIST 630. Prairie Earth, Prairie Homes: A Field School. 3 Credits.
Exploration, investigation, and restoration of earth buildings on the northern plains. Students study the cultures that created earth buildings; encounter the buildings as cultural artifacts; and engage in hands-on restoration work. {Also offered for undergraduate credit - see HIST 430.}.

HIST 631. The North American Plains. 3 Credits.
Historical treatment of the Great Plains of North America as an international region, comprising the Canadian prairies and the American plains. {Also offered for undergraduate credit - see HIST 431.}.

HIST 634. Environmental History. 3 Credits.
Traces the changing relationship between human cultures and the natural world through time, mainly in North America. Examines the causes and consequences of major changes to landscapes and plant and animal species and ecosystems, analyzes the emergence of the conservation and environmental movements, identifies shifts in environmental thought, and traces the development of environmental laws and policies. {Also offered for undergraduate credit - see HIST 434.}.

HIST 635. World Environmental History. 3 Credits.
The course examines the relationship between peoples and their environment over time in selected areas of the world. It focuses on the past two thousand years from the Roman Empire to the present. {Also offered for undergraduate credit - see HIST 435.}.

HIST 636. American Frontier to 1850. 3 Credits.
Early American frontier from 1500's to mid-1800's, emphasizing Indian-White relations, colonial wars, social life in the backcountry, and exploration and settlement. {Also offered for undergraduate credit - see HIST 436.}.

HIST 638. Historical Archaeology. 3 Credits.
Examines the development, methods, and research themes of historical archaeology. Cross-listed with ANTH 638. Dual-listing: ANTH 438 and HIST 438.

HIST 640. The Ottoman Empire. 3 Credits.
This course examines the growth of the Ottoman Empire after 1300 and then analyzes its responses to a variety of challenges after 1683. We examine Balkan states such as Greece and Serbia, Arab lands such as Iraq and Egypt, and Turkey itself. Topics examined include the role of Islam in Ottoman administration, the rights of religious minorities such as Christians and Jews, and the evolution of Arab nationalism. {Also offered for undergraduate credit - see HIST 440.}.

HIST 650. Ancient History. 3 Credits.
Cultural, political, economic, and social history of the ancient Near East, Greece, and Rome. {Also offered for undergraduate credit - see HIST 450.}.

HIST 651. Medieval History. 3 Credits.
Cultural, political, economic, and social history of the Middle Ages. {Also offered for undergraduate credit - see HIST 451.}.

HIST 652. The Viking Age. 3 Credits.
This course offers an intensive look at the Scandinavian peoples of Europe in the central Middle Ages, between AD 750 and 1100. While it is true that for nearly three centuries, Viking pirates ravaged the coasts of Europe and terrorized European Christians, these feared Norsemen were also traders and intrepid explorers, who established a network of connections that stretched from North America to Baghdad and who developed a complex society and culture. It is their achievements, political, cultural and religious, that this class seeks to illumine. {Also offered for undergraduate credit - see HIST 452.}.

HIST 654. Renaissance and Reformation. 3 Credits.
Political, social, and economic history of continental Europe from 1400 to 1650; with a focus on Renaissance and Reformation. {Also offered for undergraduate credit - see HIST 454.}.

HIST 656. Europe 1815-1914. 3 Credits.
Political, social, and economic history of Europe from the defeat of Napoleon to outbreak of World War I. {Also offered for undergraduate credit - see HIST 456.}.

HIST 657. Europe Since 1914. 3 Credits.
Political, social, and economic history of Europe including World War I, the Russian Revolution, Nazism, World War II, and the postwar era. {Also offered for undergraduate credit - see HIST 457.}.

HIST 664. Imperial Spain. 3 Credits.
The history of Spain as a global imperial power, beginning with the marriage of Ferdinand and Isabella in 1469 and concluding with the Latin American wars for independence in the early nineteenth century. {Also offered for undergraduate credit - see HIST 464.}.

HIST 665. Germany since 1750. 3 Credits.
This course traces the evolution of the main German-speaking regions of Europe into modern, industrialized nation-states. From the time of Bach to the fall of the Berlin Wall and beyond, we analyze key trends and events in the politics, society, and culture of Prussia, Imperial Germany, the Weimar Republic, Austria, the Nazi dictatorship, East and West Germany, and the expanded Federal Republic after 1989. {Also offered for undergraduate credit - see HIST 465.}.

HIST 666. History Of Russia I. 3 Credits.
Cultural, diplomatic, intellectual and political history of Russia; evolution of the Russian state, expansion of Imperial Russia, Great Reforms, populism, and socialism.

HIST 667. History of Russia II. 3 Credits.
Cultural, diplomatic, intellectual, and political history of Russia and the Soviet Union; agriculture, industry, Marxism in Russia, revolution of 1905 and 1917, and the Soviet Union from Lenin to present. {Also offered for undergraduate credit - see HIST 467.}.

HIST 673. Colonial Mexico. 3 Credits.
Study of the important social, economic, political, and cultural developments in Mexican history from the pre-Columbian epoch through the wars for independence, ending in 1821. {Also offered for undergraduate credit - see HIST 473.}.

HIST 674. Modern Mexico. 3 Credits.
Study of the important social, economic, political, and cultural developments in Mexican history from independence in 1821 through the contemporary era. {Also offered for undergraduate credit - see HIST 474.}.

HIST 675. The Aztec, Maya, and Inca. 3 Credits.
The history of native peoples in Latin America, including the Aztec, Maya, and Inca, from the pre-Columbian era to the present day. {Also offered for undergraduate credit - see HIST 475.}.

HIST 677. Slavery in the Atlantic World. 3 Credits.
This course examines the social, economic, political, and cultural aspects of the history of slavery in the Atlantic world from the 1400s to 1888 with an emphasis on Brazil and the Caribbean. {Also offered for undergraduate credit - see HIST 477.}.

HIST 679. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

HIST 686. Plague! Tragedies and Triumphs of Globalization. 3 Credits.
This course examines how, from the Middle Ages to the present, infectious diseases have played a fundamental role in the development of modern modes of economics and government, public health, and modern technologies, thereby shaping global history. {Also offered for undergraduate credit - See HIST 486.}.

HIST 690. Graduate Seminar. 1-3 Credits.

HIST 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HIST 695. Field Experience. 1-15 Credits.

HIST 696. Special Topics. 1-5 Credits.

HIST 702. Historiography. 3 Credits.
An introduction to the history of historical thought, from the classical Greeks to the present, with examination of some of the works of important historians writing in the Western tradition.

HIST 705. Directed Research. 1-4 Credits.
Directed research on the student's thesis prospectus. Taken close to the end of the student's course work. Prereq: HIST 701.

HIST 710. Research Seminar in North American History. 3 Credits.
This course requires preparation of a research paper. The subject of the research will be within an announced general topic area of North American history. May be repeated.

HIST 712. Research Seminar in European History. 3 Credits.
This course requires preparation of a research paper. The subject of the research will be within an announced general topic area of European history. May be repeated.

HIST 714. Research Seminar in World History. 3 Credits.
This course requires preparation of a research paper. The subject of the research will be within an announced general topic area of World history. May be repeated.

HIST 730. Readings in North American History. 3 Credits.
A historiographical survey of a selected topic in North American history. Topics vary by semester. May be repeated. Recommended Coreq: HIST 701.

HIST 740. Readings in Public History. 3 Credits.
A historiographical survey of Public History in the United States. Topics vary by semester. May be repeated.

HIST 760. Readings in European History. 3 Credits.
Historiographical survey of a selected topic in European history. Topics vary by semester. May be repeated. Recommended Coreq: HIST 701.

HIST 780. Readings in World History. 3 Credits.
Historiographical survey of a selected topic in World history. Topics vary by semester. May be repeated. Recommended Coreq: HIST 701.

HIST 790. Graduate Seminar. 1-3 Credits.

HIST 791. Temporary/Trial Topics. 1-5 Credits.

HIST 793. Individual Study/Tutorial. 1-5 Credits.

HIST 794. Practicum. 1-8 Credits.

HIST 795. Field Experience. 1-15 Credits.

HIST 796. Special Topics. 1-5 Credits.

HIST 797. Master's Paper. 1-3 Credits.

HIST 798. Master's Thesis. 1-10 Credits.

HIST 899. Doctoral Dissertation. 1-15 Credits.

Honors (HON)

HON 151. Sapien Logic. 3 Credits.
This is a first year seminar for students in the honors program. In this course students examine human thought and imagination from various perspectives, including philosophy, history, literature, religion, science, and art. Students confront the limits of their own personal knowledge and the limits of our collective knowledge as a species. In so doing, students must also consider how we come to know things about our world.

HON 191. Seminar. 1-5 Credits.

HON 193. Undergraduate Research. 1-5 Credits.

HON 251. Leadership Development. 2 Credits.
This honors course will introduce students to both strengths based leadership and essential competencies for leadership development. Experts from across campus will guide students through the competencies. Prereq: Students must be in the honors program to participate in this course.

HON 291. Seminar. 1-5 Credits.
A group of students engaged, under a professor or professors, in research or criticism and in presentation of reports pertaining thereto.

HON 340. Colloquium in the Humanities. 3 Credits.
Interdisciplinary exploration of selected topics in the humanities; emphasis on integrating information and perspectives from multiple disciplines and on student participation through discussion, research, writing, and projects. May be repeated for credit with change in topic. Prereq: Admission to Honors program.

HON 341. Colloquium in the Social Sciences. 3 Credits.
Interdisciplinary exploration of selected topics in the social sciences; emphasis on integrating information and perspectives from multiple disciplines and on student participation through discussion, research, writing, and projects. May be repeated for credit with change in topic. Prereq: Admission to Honors program.

HON 342. Colloquium in the Sciences. 3 Credits.
Interdisciplinary exploration of selected topics in the sciences; emphasis on integrating information and perspectives from multiple disciplines and on student participation through discussion, research, writing, and projects. May be repeated for credit with change in topic. Prereq: Admission to Honors program.

HON 386. World Literature: Imaginary Homelands. 3 Credits.
Reading and discussion of works from literatures around the world, including philosophical non-fiction, emphasizing the diversity of responses to the human condition. Prereq: Admission to Honors Program.

HON 391. Seminar. 1-5 Credits.

HON 394. Individual Study. 1 Credit.

HON 396. Field Experience. 1-15 Credits.

HON 489. Senior Thesis. 1-6 Credits.
Primary research or creative activity under the guidance of a faculty member.

HON 491. Seminar. 1-5 Credits.

HON 493. Undergraduate Research. 1-5 Credits.

HON 494. Individual Study. 1-5 Credits.

Human & Community Education (H&CE)

H&CE 194. Individual Study. 1-5 Credits.

H&CE 196. Field Experience. 1-15 Credits.

H&CE 199. Special Topics. 1-5 Credits.

H&CE 232. Philosophy and Policy. 3 Credits.
Principles, philosophies, development, and implementation of agricultural education, family and consumer sciences education, business education, and extension programs. Analysis of evolving concepts with emphasis on history, legislation, and principles underlying organization and practice.

H&CE 291. Seminar. 1-3 Credits.

H&CE 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

H&CE 294. Individual Study. 1-5 Credits.

H&CE 299. Special Topics. 1-5 Credits.

H&CE 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

H&CE 391. Seminar. 1-3 Credits.

H&CE 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

H&CE 394. Individual Study. 1-5 Credits.

H&CE 399. Special Topics. 1-5 Credits.

H&CE 444. Planning the Community Program in Agricultural Education. 3 Credits.
Determining resources and trends of local communities. Emphasis on agricultural education program policies; planning and managing the primary program components; strategies for the management and organization of youth and adult programming in agricultural education. Prereq: Admission to School of Education. {Also offered for graduate credit - See H&CE 644.}.

H&CE 445. Designing and Delivering Nonformal Education Programs. 3 Credits.
Methods of formal and non-formal educational programs. Focuses on the principles, theories, techniques, and applications for developing and planning non-formal education programs for youth and adults. Topics include program development strategies, facilitation techniques, and evaluation.

H&CE 446. Extension Education. 3 Credits.
Designed for students from any major who are interested in learning more about the cooperative extension service. The course introduces the cooperative extension mission, philosophy, history, and program areas. Basic program development and evaluation, teaching methods, and extension teaching and delivery methods are also addressed. {Also offered for graduate credit - see H&CE 646.}.

H&CE 467. Leading Youth Organizations. 3 Credits.
This course is designed to prepare CTSO advisors and other youth group advisors to facilitate youth organizations, build leadership in students, raise awareness of benefits of youth organizations, and manage the functions of youth organizations. Prereq: Admission to the School of Education or department permission. {Also offered for graduate credit - see H&CE 667.}.

H&CE 468. Foundations of Family and Consumer Sciences Education. 3 Credits.
Preparation for a career in the unique field of Family and Consumer Sciences Education by providing a foundation of history, practical methods, and alternative assessments for students of all ages and in various environments. Prereq: Admission to the School of Education. {Also offered for graduate credit - see H&CE 668.}.

H&CE 469. Housing Education and Issues. 3 Credits.
Issues, curricula, and techniques for teaching and evaluating K-12 and adult housing programs. {Also offered for graduate credit - see H&CE 669.}.

H&CE 474. Extension Internship. 4 Credits.
Supervised full-time family and consumer sciences extension internship in an approved location. Prereq: H&CE 345.

H&CE 480. Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education. 3 Credits.
Methods of planning and teaching in agricultural education laboratories at secondary and post-secondary levels. Learning theories, innovations, and advanced principles in science, technology, engineering and mathematics teaching methods, materials, and ethics. {Also offered for graduate credit - see H&CE 680.}.

H&CE 480L. STEM Teaching Methods in Agricultural Education Lab. 1 Credit.
Practical application of lab teaching methods in agricultural education. Includes experiential learning through agricultural lab planning, management, and maintenance. An emphasis is placed on project planning, development, and implementation. Prereq or Coreq: Restricted to Ag Ed and Pre-Ag Ed majors.

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 481L. Methods of Teaching Agriculture Lab. 1 Credit.
Planning and teaching agricultural education lessons using a variety of methods in a simulated and/or actual classroom environment. Prereq or Coreq: Restricted to Ag Ed and Pre-Ag Ed majors.

H&CE 482. Methods of Teaching Family and Consumer Sciences. 3 Credits.
Preparation for teaching in the unique field of Family and Consumer Sciences through discussion of programmatic issues; experiences in planning labs and assessments as well as lessons, units, and courses; and opportunities to examine and practice teaching techniques, classroom management, and professionalism. Prereq: EDUC 451 and H&CE 468. {Also offered for graduate credit - see H&CE 682.}.

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 488. Applied Student Teaching. 3 Credits.
Guided student teaching experience including application of lesson planning, portfolio development, professional goal-setting, and supervised teaching in an approved and accredited school. Prereq: Admission to School of Education, completion of professional education sequence. Coreq: EDUC 485 or H&CE 483P, EDUC 487. Cross-listed with H&CE 488. {Also offered for graduate credit - see H&CE 688P.}.

H&CE 491. Seminar. 1-5 Credits.

H&CE 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

H&CE 494. Individual Study. 1-5 Credits.

H&CE 496. Field Experience. 1-15 Credits.

H&CE 499. Special Topics. 1-5 Credits.

H&CE 645. Designing and Delivering Nonformal Education Programs. 3 Credits.
Methods of formal and non-formal informal educational programs. Focuses on the principles, theories, techniques, and applications for developing introduction and planning non-formal education programs for youth and adults. Topics include program development strategies, facilitation techniques, and evaluation.

H&CE 646. Extension Education. 3 Credits.
Designed for students from any major who are interested in learning more about the cooperative extension service. The course introduces the cooperative extension mission, philosophy, history, and program areas. Basic program development and evaluation, teaching methods, and extension teaching and delivery methods are also addressed. {Also offered for undergraduate credit - see H&CE 446.}.

H&CE 667. Leading Youth Organizations. 3 Credits.
This course is designed to prepare CTSO advisors and other youth group advisors to facilitate youth organizations, build leadership in students, raise awareness of benefits of youth organizations, and manage the functions of youth organizations. {Also offered for undergraduate credit - see H&CE 467.}.

H&CE 668. Foundations of Family and Consumer Sciences Education. 3 Credits.
Preparation for a career in the unique field of Family and Consumer Sciences Education by providing a foundation of history, practical methods, and alternative 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 669. Housing Education and Issues. 3 Credits.
Issues, curricula, and techniques for teaching and evaluating K-12 and adult housing programs. {Also offered for undergraduate credit - see H&CE 469.}.

H&CE 680. Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education. 3 Credits.
Methods of planning and teaching in agricultural education laboratories at secondary and post-secondary levels. Learning theories, innovations, and advanced principles in science, technology, engineering and mathematics teaching methods, materials, and ethics. Prereq: Admission to the School of Education or by permission of the instructor. {Also offered for undergraduate credit - see H&CE 480.}.

H&CE 681P. Methods of Teaching Agriculture. 3 Credits.
Methods of planning and teaching agricultural education in secondary and post-secondary settings. Learning theories, innovations and advanced principles in teaching methods and materials, and ethics. {Also offered for undergraduate credit - see H&CE 481.}.

H&CE 682. Methods of Teaching Family and Consumer Sciences. 3 Credits.
Preparation for teaching in the unique field of Family and Consumer Sciences through discussion of programmatic issues; experiences in planning labs and assessments as well as lessons, units, and courses; and opportunities to examine and practice teaching techniques, classroom management, and professionalism. Prereq: H&CE 668 and admitted to the School of Education. {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 696. Special Topics. 5.00 Credits.

H&CE 724. Program Planning in School-Based and Extension Programs. 3 Credits.
Development of curricula and programs in all areas of extension and federally reimbursed programs in Career and Technical education. Includes long-range and strategic planning competencies.

H&CE 740. Advanced CTE Philosophy and Policy. 3 Credits.
A historical and contemporary overview of the philosophies associated with the development, planning, and conducting of Career and Technical Education programs at the local, state, and federal levels, while addressing the role and importance of policy and research.

H&CE 743. Experiential and Learner-Centered Instruction. 3 Credits.
Theory and practice in facilitating learning from experiences in formal and non-formal settings. Special focus is given to experiential learning in classroom/laboratory settings/non-formal settings, guided inquiry, internships/externships/work-based learning, service learning, project-based learning, problem-based learning, and outdoor/adventure learning.

H&CE 746. International Extension. 3 Credits.
The ideological and theoretical basis of world agricultural assistance programs and their effects on different sectors and classes.

H&CE 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 796. Special Topics. 1-5 Credits.

H&CE 797. Master's Paper. 1-3 Credits.

H&CE 798. Master's Thesis. 1-10 Credits.

H&CE 893. Individual Study/Tutorial. 1-5 Credits.

Human Development & Family Science (HDFS)

HDFS 186. Smart Spending and Saving. 3 Credits.
A foundation for managing financial resources effectively for life-long financial wellbeing. Focus is on the skills and tools needed to organize and manage personal finances with an emphasis on consumer decision making.

HDFS 194. Individual Study. 1-5 Credits.

HDFS 196. Field Experience. 1-15 Credits.

HDFS 199. Special Topics. 1-5 Credits.

HDFS 230. Life Span Development. 3 Credits.
Study of human growth and development throughout the life span.

HDFS 242. Couples, Marriages and Families. 3 Credits.
Study of the formation of relationships in varied contexts: examines the diversity of couples, marriages, and families that exists in our contemporary society. Emphasis will be on relationship health as well as barriers to relationship wellness.

HDFS 250. Introduction to Research Methods in Human Development and Family Sciences. 3 Credits.
Undergraduate orientation to research methods in human development and marital/family relationships; students will explore the scientific method as applied to HDFS, methods/issues related to data collection, and methods of data analysis.

HDFS 275. Diversity and Multiculturalism in Individual and Family Life. 3 Credits.
This course includes the study of developmental and family issues as viewed from a perspective of diversity and multiculturalism. Emphasis will be placed on understanding the role of factors such as race, ethnicity, social class, religion, sexual orientation, gender identity, and disability in developmental and family processes.

HDFS 291. Seminar. 1-5 Credits.

HDFS 320. Prenatal, Infant and Toddler Development. 3 Credits.
Study of growth and development of the child from conception to age 3. Prereq: HDFS 230.

HDFS 330. Child Development. 3 Credits.
Study of children, three years through middle childhood. Emphasis on social, cognitive, physical, and emotional development. Prereq: HDFS 230.

HDFS 340. Adolescent Development. 3 Credits.
Study of physical, social, cognitive, and emotional development of adolescents. Includes examination of contemporary issues related to this age group. Prereq: HDFS 230.

HDFS 341. Parent-Child Relations. 3 Credits.
Contemporary parenting principles and strategies. Emphasis on application in the home and professional settings. Prereq: HDFS 230 or HDFS 242.

HDFS 350. Fundamentals of Hospital Child Life. 3 Credits.
Introduction to the child life profession through exploring the needs of hospitalized children. Child development theories will be used to understand coping and intervention techniques for the hospitalized child. Prereq: HDFS 230. Co-req: HDFS 250.

HDFS 353. Children, Families and Public Policy. 3 Credits.
Interaction of the national economy and the family economy with regard to the public programs affecting well-being of families. Emphasis on philosophies of service delivery and policy alternatives. Prereq: HDFS 230 and HDFS 242.

HDFS 357. Personal and Family Finance. 3 Credits.
Factors influencing decisions on acquiring and using financial resources and budgeting to achieve goals. Overview of credit, taxation, savings, insurance, and investments.

HDFS 360. Adult Development and Aging. 3 Credits.
Study of development during adulthood and later life. Emphasis on perceptual-motor and cognitive functioning, personality, adjustment, social, familial, and cultural aspects of adulthood. Prereq: HDFS 230 or enrolled in the Aging Studies certificate or Gerontology minor.

HDFS 380. Introduction to Mental Health Professions. 3 Credits.
This course is designed as an introduction to the mental health field. Through class assignments and discussions, students will be able to make a more informed decision about which type of mental health profession (e.g., Mental Health Counseling, Professional Counseling, Couple and Family Therapy, Clinical Social Work, Counseling Psychology, Clinical Psychology, etc.) holds potential for them in their own professional pursuits. Further, students will be exposed to several clinical settings and begin preparing application materials for graduate programs. Students who successfully complete this course should be well versed in the basics of counseling and psychotherapy including interviewing, professional ethics, multicultural awareness and relationship building with clients. Prereq or Coreq: Junior standing or higher to enroll.

HDFS 389. Pre-Field Experience. 2 Credits.
In this course, HDFS majors will prepare for field experience and engage in career exploration. Students will undertake the process of selecting a field experience site, setting goals for internship, and completing training requirements needed prior to field experience. Additionally, students will be introduced to various career options in HDFS, explore personal career interests, and plan for the career launching process. Prereq: 6 credits of HDFS 300-400 level courses. Restrictions: HDFS Major/Minor or instructor permission.

HDFS 390. Career Development. 1 Credit.
Analysis and integration of professional perspectives and trends; life career development skills (self-assessment, resume writing, interviewing, and correspondence.) 1 lecture. Prereq or Coreq: Junior standing.

HDFS 394. Individual Study. 1-5 Credits.

HDFS 397. Fe/Coop Ed/Internship. 1-4 Credits.

HDFS 424. Observation and Assessment of Children. 3 Credits.
Overview of observation/assessment of children for research and practice application. Prereq: HDFS 320, 330.

HDFS 430. Topics in Cognitive Development. 3 Credits.
Understanding the fundamentals of cognitive development in children, adolescents and/or adults. Topics vary each time the course is offered and may include cognition, perception, concepts, reasoning, memory, and language. May be repeated for credit with change in subtopic. Prereq: 6 credits of HDFS 300-400 level coursework.

HDFS 435. Topics in Socioemotional Development. 3 Credits.
Understanding the fundamentals of socio-emotional development in children, adolescents and/or adults. Topics vary each time the course is offered and may include temperament, peer relations, moral development, emotional development, gender development, or development of self-concept. May be repeated for credit with change in subtopic. Prereq:6 credits of HDFS 300-400 level coursework.

HDFS 445. Topics in Family Science: (sub-topic). 3 Credits.
Advanced study of specific topic areas in Family Science. Topics vary each time the course is offered and may include mate selection, divorce, step-families, poverty, etc. May be repeated for credit with change in subtopic. Prereq: 6 credits of HDFS 300-400 level coursework and students must be a major with junior or senior standing in HDFS, WGS or FACS.

HDFS 448. Issues In Sexuality. 3 Credits.
Study of personal, interpersonal, and societal meanings of human sexuality. Decision making relevant to sexual behavior. Prereq: HDFS 230 and HDFS 242.

HDFS 462. Methods of Family Life Education. 3 Credits.
Introduces students to the study of various family issues including crisis, stress, diversity and change and the role of family life education as a method of preventing or mediating family distress. Prereq: 6 credits of HDFS 300-400 level coursework.

HDFS 468. Families and Work. 3 Credits.
Issues, opportunities and problems related to the interface of work and family. Topics include household division of labor, trends in the labor market, and work-family policy. Prereq: HDFS 242 and HDFS 250 and junior or senior standing. {Also offered for graduate credit - see HDFS 668.}.

HDFS 477. Financial Counseling. 3 Credits.
Advanced analysis of family financial issues. Evaluation of alternative financial programs. Prereq: HDFS 357. {Also offered for graduate credit - see HDFS 677.}.

HDFS 480. Community Resources of Later Life. 3 Credits.
This course will expose students to the various policies and programs focused on providing services to older adults. Additionally, this course will emphasize the theoretical knowledge that underscores an understanding of the social and psychological dynamics of help seeking behavior in later life. Prereq: HDFS 230 or enrolled in the Aging Studies certificate or Gerontology minor.

HDFS 482. Family Dynamics of Aging. 3 Credits.
Examination of issues related to family life in the later years from the perspectives of aging individuals and their families. Prereq: HDFS 242 or enrolled in the Aging Studies certificate or Gerontology minor.

HDFS 483. Best Practices, Play and Activities from Birth Through Adolescence. 3 Credits.
This course will provide students with an in-depth understanding of play at various ages, as well as provide guidance in planning and understanding the use of developmentally appropriate practices, activities and materials from infancy through adolescence. A strong emphasis on play as an essential element of development, theories of play, guided play and play development will be incorporated into this course. Prereq: HDFS 320 and HDFS 330. Co-req: HDFS 340.

HDFS 491. Seminar. 1-5 Credits.

HDFS 493. Undergraduate Research. 1-5 Credits.

HDFS 494. Individual Study. 1-5 Credits.

HDFS 496. Field Experience. 1-15 Credits.

HDFS 499. Special Topics. 1-5 Credits.

HDFS 677. Financial Counseling. 3 Credits.
Advanced analysis of family financial issues. Evaluation of alternative financial programs. {Also offered for undergraduate credit - see HDFS 477.}.

HDFS 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HDFS 696. Special Topics. 1-5 Credits.

HDFS 705. Quantitative Methods in Developmental Science. 3 Credits.
This course is an introduction to quantitative analyses commonly used in developmental science. Special emphasis will be placed on statistical concepts and applying and interpreting tests of statistical inference that are associated with the field. Prereq: Graduate standing in HDFS, Developmental Science or related field.

HDFS 710. Foundations of Youth Development. 3 Credits.
This course provides an introduction to the field of positive youth development (PYD) including an overview of key theory and practice principles that enhance the profession of youth work. This course is designed to provide a foundation of basic knowledge and skills that students will need to be successful in any course in the Great Plains-IDEA Youth Development programs.

HDFS 711. Youth Development. 3 Credits.
An introduction to the developmental period of adolescence through the lens of theory and research in positive youth development. The course emphasizes how the developmental tasks of this life stage are influenced by (and influence) family and home, school, peers, and other contextual forces. Students critically examine theoretical and research literature and become familiar with major issues and transitions adolescents face.

HDFS 712. Positive Youth Development in Community Settings. 3 Credits.
This course uses a strengths-based or asset-based approach to community youth development and encompasses individual development (i.e. positive youth development) and adolescents' interrelationships with their environments. Emphasis is placed on research, theory, and practice applied to communities throughout the U.S. Students will explore existing models, read theoretical and applied literature, and examine current community efforts as a basis for understanding community youth development.

HDFS 713. Adolescents and Their Families. 3 Credits.
This course explores adolescent development in the context of the family. The bi-directional influences between adolescents and their families will be examined. Implications for professionals working with youth and families will be explored and highlighted.

HDFS 714. Contemporary Youth Issues. 3 Credits.
This course presents issues faced by youth today and associated risk and resiliency factors. A different topic is presented each year. Past topics have included Youth Violence, Youth and Appearance, and Volunteerism. The course may be taken more than once, as long as the topic areas are different each time.

HDFS 715. Youth Culture. 3 Credits.
This course examines youth as a culture, and youth culture within multiple contexts (education, peers, work, sports, family, technology, music, media, politics, and activism). Students will think critically about how society supports and restricts youth culture, and gain further knowledge of how ethnic groups fit historically into society and how history has shaped current youth culture. Students will address biases and myths about youth and explore the social and educational processes experienced by youth through in-depth reading, writing, discussion, critical listening, viewing of contemporary videos, and informal interviews with youth.

HDFS 716. Youth Professionals as Consumers of Research. 3 Credits.
Students will learn the basics of quantitative and qualitative research approaches that will enable them to understand, evaluate, and critique research articles. Students will be able to judge the validity and usefulness of research articles in order to guide their educational or therapeutic interventions or public policy decisions.

HDFS 717. Design and Evaluation of Youth Programs. 3 Credits.
This course focuses on the principles and methods of the design and evaluation of youth programs. Students will learn about hands-on tools for conducting evidence-based planning and evaluating the performance and delivery of a program. Students will develop knowledge through participating in a community-based project involving the practical application of program design and evaluation methods. The goal is to prepare students for research supported planning and evaluation of programs that aim at positive youth development.

HDFS 718. Youth Development Personnel and Program Management. 3 Credits.
This course introduces students to the development, administration, and management of youth programs and youth-serving organizations with special focus being on the roles and responsibilities of administrators and managers.

HDFS 719. Youth Policy. 3 Credits.
This course examines various federal and state policies that affect developmental opportunities for youth. Students will examine how and why such policies are constructed. We will explore how various policies contribute to or undermine positive youth development outcomes.

HDFS 721. Contemporary Perspectives on Adult Development and Aging. 3 Credits.
The course covers physical, cognitive, social, and personal dimensions of adult development from a lifespan developmental perspective. This course takes an integrative perspective on aging that (a) considers the impact of prior development and socio-historical influences on late life development (b) emphasizes aging processes across diverse groups and contexts, and (c) identifies pathways to optimal functioning.

HDFS 722. Applied Research Methods and Evaluation of Aging Programs. 3 Credits.
This course will familiarize students to applied research methods as they apply to aging programs, such as: needs assessment, formative research, process evaluation, and impact assessment. Students will learn theories and concepts of evidence-informed practice and program evaluation, perform the skills to conduct methodologically sound program evaluation research, and gain practical experience and strategies for application.

HDFS 723. Foundations in Integrative Aging Studies. 3 Credits.
This course introduces foundational concepts to the interdisciplinary field of gerontology and aging studies, including: core theories of aging, how to be critical consumers of aging research, developing writing and other professional skills, and exploring career options in aging.

HDFS 725. Socioemotional and Cognitive Well-being throughout Adulthood. 3 Credits.
This course addresses cognitive, social, and emotional health in adulthood and later life including typical and atypical changes such as wisdom, dementia, coping, and depression. Contrasting theoretical frameworks and considering positions of access and resilience, students will examine personality, mental health, and cognitive and brain functioning during adulthood and review methods to enhance psychological health.

HDFS 726. Family Relationships and Aging. 3 Credits.
Examination of research and theories on family dynamics and transitions in mid-to-late life, how they impact adults and their family relationships, and the practices and professional ethics of working with diverse older adults and their families. Prereq: 6 credits social science.

HDFS 730. Youth-Adult Relationships. 3 Credits.
This course examines the role of caring adults in promoting the positive development of youth. Students will explore the spectrum of adult attitudes toward youth as well as activities that invite youth to engage and develop agency. The course will include examination of the research and practice of mentorship, youth-adult partnerships, and youth leadership.

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 760. Aging Policy and Advocacy. 3 Credits.
This course covers the formation, implementation, and impact of various policies and programs focused on providing services and supports for the social, financial, and physical well-being of aging persons within their communities. A primary focus is placed on addressing challenges and gaps in policies, as well as issues of unmet needs and inequity through advocacy and policy-making.

HDFS 761. Implementation of Community Programs for Older Adults. 3 Credits.
This course addresses theoretical and practical aspects of community-based efforts to influence the well-being of older adults. Examines literature from gerontological, prevention science, human sciences, and community health approaches. Provides an overview of the program development, implementation, evaluation, and management of aging-related programs.

HDFS 762. Retirement Planning, Employee Benefits and the Family. 3 Credits.
Critical examination of micro and macro considerations in retirement planning for individuals and families.

HDFS 763. Personal Income Taxation. 3 Credits.
Study of principles and concepts of personal income tax planning as they relate to families.

HDFS 765. Insurance Planning for Families. 3 Credits.
An in-depth study of risk management concepts, tools, and strategies for individuals and families.

HDFS 766. Estate Planning for Families. 3 Credits.
Study of principles and concepts of estate planning as they relate to families.

HDFS 767. Professional Practices in Family Financial Planning. 3 Credits.
Study of strategies and methods for managing private family financial planning practices including ethics, compensation, client-centered marketing and practice management.

HDFS 768. Housing/Real Estate. 3 Credits.
Overview of the role of housing and real estate in the family financial planning process including taxation, law, mortgages, ethics and financial calculations.

HDFS 769. Financial Planning Case Studies. 3 Credits.
Examines professional issues in family financial planning including ethics, regulation on certification, communication, and professional responsibility. Emphasis on personal finance case studies and investment policy.

HDFS 770. Fundamentals of Financial Planning. 3 Credits.
Survey of personal/family financial planning including process, time value of money, cash management, credit, taxation, insurance, housing, investments, retirement, and estate planning.

HDFS 771. Investing for the Family's Future. 3 Credits.
Study of the concepts of time and risk value of money in evaluating investment markets.

HDFS 772. Military Personal Financial Readiness. 3 Credits.
Preparation of Financial Counselors and Planners regarding the unique needs and resources of military service members and their families. Focus on mission readiness and overall financial well-being.

HDFS 790. Graduate Seminar. 1-3 Credits.

HDFS 791. Temporary/Trial Topics. 1-5 Credits.

HDFS 793. Individual Study/Tutorial. 1-5 Credits.

HDFS 794. Practicum/Internship. 1-8 Credits.

HDFS 795. Field Experience. 1-15 Credits.

HDFS 796. Special Topics. 1-5 Credits.

HDFS 797. Master's Paper. 1-3 Credits.

HDFS 797S. Comprehensive Project. 1-6 Credits.

HDFS 798. Master's Thesis. 1-10 Credits.

HDFS 801. Graduate Orientation Seminar. 1 Credit.
Introduction to graduate program, faculty, policies and procedures.

HDFS 802. Teaching and Learning in the Human Sciences. 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 the human sciences.

HDFS 805. Research Methods and Scholar Development in Human Sciences. 3 Credits.
This course is an introduction to research methods commonly used in human sciences, including activities for students to develop as scholars. Areas covered will include sampling, survey and experimental research designs, and writing and speaking about research in multiple formats.

HDFS 811. Developmental Concepts and Theories. 3 Credits.
This course is an advanced study of the theories and concepts of development throughout the lifespan. Students will be introduced to relevant historical and current theoretical work on biological, cognitive, and socio-emotional human development. Using interdisciplinary lifespan perspectives, we will explore conceptualizations of developmental change and examine implications for research and applications.

HDFS 813. Social and Emotional Development Across the Lifespan. 3 Credits.
This course is an advanced study of the concepts and research of social and emotional development throughout the lifespan. Students will critically evaluate historical, recent, and current empirical research on social and emotional development in the field of developmental science, and explore applications across the lifespan. Restrictions: HDFS Doctoral Student, or Instructor Permission.

HDFS 815. Physical and Cognitive Development Across the Lifespan. 3 Credits.
Critical examination of physical and cognitive change in human development across the lifespan, including major theories and key research in the area. Emphasis will be on the interplay of genetic/physical and contextual factors on development. Restrictions: HDFS doctoral student or Instructor Permission.

HDFS 817. Prevention Science. 3 Credits.
This course examines the field of prevention science and intervention programs in the context of human development, relationships and well-being across the lifespan. Restrictions: Human Development and Family Science doctoral student, or instructor permission.

HDFS 824. Advanced Topics in Socioemotional Development. 3 Credits.
Critical examination of socio-emotional development. Topics vary each time the course is offered and may include temperament, peer relations, moral development, emotional development, gender development, or development of self-concept. May be repeated for credit with change in subtopic.

HDFS 825. Advanced Topics in Cognitive Development. 3 Credits.
Critical examination of cognitive development. Topics vary each time the course is offered and may include cognition, perception, concepts, reasoning, memory, and language. May be repeated for credit with change in subtopic.

HDFS 830. Issues and Theories in Family Science. 3 Credits.
Exploration of foundational and contemporary theories that form the basis of the family science discipline. Examination of the complexities of family relationships and issues in a variety of contexts and life stages.

HDFS 854. Advanced Quantitative Methods in Developmental Science. 3 Credits.
Survey of advanced quantitative methods typically used in research in Developmental Science. Areas covered will include mid-level and advanced multivariate analyses, including use of SPSS software, interpretation of results, and use in current literature. Prereq: HDFS 705.

HDFS 856. Longitudinal Research Methods and Analysis. 3 Credits.
The primary focus will be on multilevel models (general linear mixed models or hierarchical linear models) as applied to studies in human development. Topics will include the measurement of change over time and the modeling of individual differences in growth trajectories by the inclusion of both time invariant and time varying covariates. Prereq: HDFS 705.

HDFS 874. Contemporary Grant Writing. 3 Credits.
This course covers all aspects of contemporary grant writing in the fields of human development and family science and couple and family therapy. Course topics include grant planning and development, writing successful proposals, budgeting, and grant management. Restrictions: Students must be enrolled in a PhD program in Couple and Family Therapy or Developmental Science or receive permission from the instructor.

HDFS 890. Graduate Seminar. 1-5 Credits.

HDFS 892. Graduate Teaching Experience. 1-6 Credits.

HDFS 893. Individual Study/Tutorial. 1-5 Credits.

HDFS 894. Practicum/Internship. 1-8 Credits.

HDFS 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

HDFS 899. Doctoral Dissertation. 1-15 Credits.

Industrial and Manufacturing Engineering (IME)

IME 111. Introduction to Industrial and Manufacturing Engineering. 3 Credits.
Overview of industrial engineering and manufacturing engineering professional careers and work environments. Basic skill acquisition using computer software tools to solve engineering problems, prepare reports, plan projects, deliver professional presentations, and manage data.

IME 194. Individual Study. 1-5 Credits.

IME 196. Field Experience. 1-15 Credits.

IME 199. Special Topics. 1-5 Credits.

IME 291. Seminar. 1-3 Credits.

IME 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

IME 294. Individual Study. 1-5 Credits.

IME 299. Special Topics. 1-5 Credits.

IME 311. Work/Station Design and Measurement. 3 Credits.
Analytical methods for measuring human performance in industrial, commercial and manufacturing settings. Development of work procedures and design of workstations. Considerations of ergonomics, safety, performance effectiveness and efficiency, interactions between workstations, information and data requirements, production throughput, training and skill requirements, and resources. Weekly laboratory.

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. Coreq: ME 212.

IME 335. Welding Technology. 3 Credits.
Study of arc and gas welding technology together with related metallurgy. Laboratory instruction in welding techniques and skills. 2 recitations, 1 two-hour laboratory.

IME 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

IME 380. CAD/CAM for Manufacturing. 3 Credits.
Coverage of CAD, numerical control, and CAM software. Use of manufacturing standards for geometric dimensioning and tolerancing. Prereq: ME 212.

IME 391. Seminar. 1-3 Credits.

IME 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

IME 394. Individual Study. 1-5 Credits.

IME 397. Fe/Coop Ed/Internship. 1-4 Credits.

IME 399. Special Topics. 1-5 Credits.

IME 411. Human Factors Engineering. 3 Credits.
A survey of human factors engineering topics with an emphasis on optimizing person-machine and person-system interactions. Human physical and cognitive capabilities will be investigated to improve work design, interface design, and usability. Prereq: IME 311, IME 460. {Also offered for graduate credit - see IME 611.}.

IME 427. Packaging for Electronics. 3 Credits.
Processes and materials for packaging of electronic components and devices, including integrated circuit chips, chip packages, and board level packaged systems; boards and substrates technology; quality and reliability of electronic packages. Open to all engineering majors. Prereq: Junior standing. Cross-listed with ECE 427. {Also offered for graduate credit - see IME 627.}.

IME 429. Introduction to IC Fabrication. 3 Credits.
This course examines issues about fabrication methods and procedures. Topics will include implantation, pattern transfer and process integration. Cross-listed with ECE 429.

IME 430. Process Engineering. 3 Credits.
Comprehensive analysis of selected manufacturing processes; mathematical modeling of process dynamics, and evaluation of processing alternatives. Design of effective and efficient processes for selected industrial products. Prereq: IME 330. Dual-listing: 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. Prereq: IME 330. Prereq or Coreq: Junior Standing. Dual-listing: IME 631.

IME 432. Composite Materials Manufacturing. 3 Credits.
Processes for manufacturing products from fiber-reinforced composite materials. Analysis of tooling, process variables and quality management during processing. Design of processes for manufacture of selected composite parts. Weekly laboratory. Prereq: IME 330, ME 331.

IME 433. Additive Manufacturing. 3 Credits.
A synchronized approach considering functional design, analysis and manufacturing that support seamless integration of geometry with performance. The course will address additive manufacturing principles; scope of additive manufacturing; bio-manufacturing. Prereq: IME 330. {Also offered for graduate credit - see IME 633.}.

IME 435. Plastics and Polymer Processing in Manufacturing. 3 Credits.
Product and process engineering for manufacturers of plastic products; material evaluation and selection, mold design, process design, quality evaluation of manufactured plastic parts. Prereq: MATH 266. {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 metalllic and non-metallic engineering materials. Prereq: IME 430 and ME 331. {Also offered for graduate credit - see IME 637.}.

IME 440. Engineering Economy. 2-3 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.
Systems thinking as a framework for better understanding the complex processes. Foundational concepts and approaches for systems thinking to generate analytical model tools and systems-based models to support the decision-making processes. Prereq or Coreq: Junior standing. Dual-listing: IME 650.

IME 451. Logistics Engineering and Management. 3 Credits.
This course emphasizes integrated logistics management methods to improve the effectiveness and efficiency of material flow, information flow and cash flow for the entire supply chains. Prereq: IME 470. Coreq: IME 450. {Also offered for graduate credit - see IME 651.}.

IME 453. Hospital Management Engineering. 3 Credits.
Survey of management engineering roles in the delivery of health care. Review of functional relationships present in health care delivery systems. Application of industrial engineering tools to solve health care delivery problems focused on cost reduction, process redesign, facility design, quality improvement, and systems integration. Prereq: Core IME courses. {Also offered for graduate credit - see IME 653.}.

IME 456. Program and Project Management. 3 Credits.
Integrated approaches to managing engineering, technology and business projects, addressing the project management lifecycle including initiating, planning, executing, controlling and closing. Additional topics include program management, portfolio management, and applying principles in a business environment. Prereq: Junior standing. {Also offered for graduate credit - see IME 656.}.

IME 460. Evaluation of Engineering Data. 3 Credits.
Design of engineering experiments and evaluations, curve fitting, regression, hypothesis testing, ANOVA, Taguchi methods in engineering design. Coreq: MATH 166. {Also offered for graduate credit - see IME 660.}.

IME 461. Quality Assurance and Control. 3 Credits.
Proactive and reactive quality assurance and control techniques; emphasis on quality planning, statistical process control, acceptance sampling, and total quality management. Issues in reliability and maintainability engineering. Prereq: IME 460. {Also offered for graduate credit - see IME 661.}.

IME 462. Total Quality In Industrial Management. 3 Credits.
The meaning and means for achieving 'total quality' in all dimensions of industrial activities and organizations. Topics include continuous improvement, statistical process control, leadership, and training. {Also offered for graduate credit - see IME 662.}.

IME 463. Reliability Engineering. 3 Credits.
Study and application of statistical models and methods for defining, measuring and evaluating reliability of products, processes and services: life distributions, reliability functions, reliability configurations, reliability estimation, parametric reliability models, accelerate life testing, reliability improvement. Prereq: IME 460. {Also offered for graduate credit - see IME 663.}.

IME 464. Reliability Analysis. 3 Credits.
System modeling and analysis, designing for reliability, reliability testing, reliability in manufacturing, and reliability management, fault tree analysis, RBD, and cut sets are covered along with sneak circuits, time-on-test plots and acceptance testing. Prereq: IME 460 and IME 463. {Also available for graduate credit - See IME 664.}.

IME 465. Introduction to Machine Learning. 3 Credits.
Machine learning uses interdisciplinary techniques such as statistics, linear algebra, and optimization to create automated systems that can sift through large volumes of data at high speeds to make predictions or decisions. This class will cover topics in linear regression (multivariate, subset selection, RIDGE & LASSO, and model selection), basic classification methods (kNN, Naïve Bayes, logistic regression, LDA, and SVM), and the concept of unsupervised learning (k-means cluster and PCA). Prereq: IME 460.

IME 470. Operations Research I. 3 Credits.
Techniques to optimize and analyze industrial operations. Use of linear programming, transportation models, networks, integer programming, goal programming, dynamic programming, and non-linear programming. Prereq: MATH 129. Co-req: IME 460. {Also offered for graduate credit - see IME 670.}.

IME 472. Simulation of Business and Industrial Systems. 3 Credits.
Development of the fundamentals and techniques of simulating business and industrial systems. Monte-Carlo techniques and computer usage. Prereq: IME 460, high-level computer language. {Also offered for graduate credit - see IME 672.}.

IME 480. Production and Inventory Control. 3 Credits.
Planning and controlling of industrial production and inventory: demand forecasting, master scheduling, materials requirements planning, job scheduling, assembly line balancing, and just-in-time production. Prereq: IME 460. {Also offered for graduate credit - see IME 680.}.

IME 482. Automated Manufacturing Systems. 3 Credits.
Design of integrated production systems including flexible, programmed automatic control for fabrication, assembly, packaging, movement, and storage. Numerical control, flexible manufacturing systems, and computer integrated manufacturing. 2 recitations, 1 two-hour laboratory. Prereq: IME 311, IME 330, PHYS 252. {Also offered for graduate credit - see IME 682.}.

IME 485. Industrial and Manufacturing Facility Design. 3 Credits.
Capstone integration of analysis and design tools to convert product design into production plans and plants. Prereq: Senior standing. {Also offered for graduate credit - see IME 685.}.

IME 489. Industrial and Manufacturing Engineering Capstone. 3 Credits.
Capstone experience. Student projects in design, analysis, and experimental investigation related to industrial and manufacturing engineering. Prereq: IME 482 and senior standing with less than 36 hours of required class work to graduate.

IME 491. Seminar. 1-5 Credits.

IME 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

IME 493. Undergraduate Research. 1-5 Credits.
Student research, scholarly project or creative investigation completed under the guidance of a faculty mentor. Directed independent project, collaborative work or ongoing participation in faculty research should culminate in a presentation, article or scholarly project.

IME 494. Individual Study. 1-5 Credits.

IME 496. Field Experience. 1-15 Credits.

IME 499. Special Topics. 1-5 Credits.

IME 611. Human Factors Engineering. 3 Credits.
A survey of human factors engineering topics with an emphasis on optimizing person-machine and person-system interactions. Human physical and cognitive capabilities will be investigated to improve work design, interface design, and usability. {Also offered for undergraduate credit - see IME 411.}.

IME 627. Packaging for Electronics. 3 Credits.
Processes and materials for packaging of electronic components and devices, including integrated circuit chips, chip packages, and board level packaged systems; boards and substrates technology; quality and reliability of electronic packages. Open to all engineering majors. Cross-listed with ECE 627. {Also offered for undergraduate credit - see IME 427.}.

IME 630. Process Engineering. 3 Credits.
Comprehensive analysis of selected manufacturing processes; development of process flow maps, schematic and mathematical modeling of process dynamics, and evaluation of processing alternatives. Design of effective and efficient processes for selected industrial products. Seminar/case study format. {Also offered for undergraduate credit - see IME 430.}.

IME 631. Production Engineering. 3 Credits.
Design of a production system for selected manufactured products, development of production system flow maps and linked process dynamic models, evaluation of throughput and identification of constraints. Evaluation of alternative solutions for production constraints. Undergraduate: design of fixtures, dies and tooling for economical production. Graduate: In-depth analysis of contemporary production systems for selected manufactured products; development of production systems issues. Seminar/case study format. Recommended: IME 630. {Also offered for undergraduate credit - see IME 431.}.

IME 633. Additive Manufacturing. 3 Credits.
A synchronized approach considering functional design, analysis and manufacturing that support seamless integration of geometry with performance. The course will address additive manufacturing principles; scope of additive manufacturing; bio-manufacturing. {Also offered for undergraduate credit - see IME 433.}.

IME 635. Plastics and Injection Molding Manufacturing. 3 Credits.
Product and process engineering for manufacturers of plastic products; material evaluation and selection, mold design, process design, quality evalutaion 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 metalllic and non-metallic engineering materials. {Also offered for undergraduate credit - see IME 437.}.

IME 640. Engineering Economy. 3 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.
Systems thinking as a framework for better understanding the complex processes. Foundational concepts and approaches for systems thinking to generate analytical model tools and systems-based models to support the decision-making processes. Dual-listing: IME 450.

IME 651. Logistics Engineering and Management. 3 Credits.
This course emphasizes integrated logistics management methods to improve the effectiveness and efficiency of material flow, information flow and cash flow for the entire supply chains. {Also offered for undergraduate credit - see IME 451.}.

IME 653. Hospital Management Engineering. 3 Credits.
Survey of management engineering roles in the delivery of health care. Review of functional relationships present in health care delivery systems. Application of industrial engineering tools to solve health care delivery problems focused on cost reduction, process redesign, facility design, quality improvement, and systems integration. Prereq: Core IME courses. {Also offered for undergraduate credit - see IME 453.}.

IME 656. Program and Project Management. 3 Credits.
Integrated approaches to managing engineering, technology and business projects, addressing the project management lifecycle including initiating, planning, executing, controlling and closing. Additional topics include program management, portfolio management, and applying principles in a business environment. {Also offered for undergraduate credit - see IME 456.}.

IME 660. Evaluation of Engineering Data. 3 Credits.
Design of engineering experiments and evaluations, curve fitting, regression, hypothesis testing, ANOVA, Taguchi methods in engineering design. {Also offered for undergraduate credit - see IME 460.}.

IME 661. Quality Assurance and Control. 3 Credits.
Proactive and reactive quality assurance and control techniques; emphasis on quality planning, statistical process control, acceptance sampling, and total quality management. Issues in reliability and maintainability engineering. Prereq: IME 660. {Also offered for undergraduate credit - see IME 461.}.

IME 662. Total Quality In Industrial Management. 3 Credits.
The meaning and means for achieving 'total quality' in all dimensions of industrial activities and organizations. Topics include continuous improvement, statistical process control, leadership, and training. {Also offered for undergraduate credit - see IME 462 .}.

IME 663. Reliability Engineering. 3 Credits.
Study and application of statistical models and methods for defining, measuring and evaluating reliability of products, processes and services: life distributions, reliability functions, reliability configurations, reliability estimation, parametric reliability models, accelerated life testing, reliability improvement. Prereq: IME 660. {Also offered for undergraduate credit - see IME 463.}.

IME 664. Reliability Analysis. 3 Credits.
System modeling and analysis, designing for reliability, reliability testing, reliability in manufacturing, and reliability management, fault tree analysis, RBD, and cut sets are covered along with sneak circuits, time-on-test plots and acceptance testing. Prereq: IME 660 and IME 663. {Also available for undergraduate credit - See IME 464.}.

IME 670. Operations Research I. 3 Credits.
Techniques to optimize and analyze industrial operations. Use of linear programming, transportation models, networks, integer programming, goal programming, dynamic programming, and non-linear programming. {Also offered for undergraduate credit - see IME 470.}.

IME 672. Simulation of Business and Industrial Systems. 3 Credits.
Development of the fundamentals and techniques of simulating business and industrial systems. Monte-Carlo techniques and computer usage. Prereq: IME 660, high-level computer language. {Also offered for undergraduate credit - see IME 472.}.

IME 680. Production and Inventory Control. 3 Credits.
Planning and controlling of industrial production and inventory: demand forecasting, master scheduling, materials requirements planning, job scheduling, assembly line balancing, and just-in-time production. Prereq: IME 660. {Also offered for undergraduate credit - see IME 480.}.

IME 682. Automated Manufacturing Systems. 3 Credits.
Design of integrated production systems including flexible, programmed automatic control for fabrication, assembly, packaging, movement, and storage. Numerical control, flexible manufacturing systems, and computer integrated manufacturing. 2 recitations, 1 two-hour laboratory. {Also offered for undergraduate credit - see IME 482.}.

IME 685. Industrial and Manufacturing Facility Design. 3 Credits.
Capstone integration of analysis and design tools to convert product design into production plans and plants. Prereq: Senior standing. {Also offered for undergraduate credit - see IME 485.}.

IME 690. Graduate Seminar. 1-3 Credits.

IME 696. Special Topics. 1-5 Credits.

IME 765. Data Analysis. 3 Credits.
Applications oriented. Topics include: statistical estimation, hypothesis testing, non-parametric methods, design of experiments, factorial experiments, response surface methodology, regression analysis, time series analysis and forecasting, multivariate methods, statistical control charts. Prereq: IME 660.

IME 770. Quantitative Modeling. 3 Credits.
Applications modeling and optimization methods. Domains: transportation, logistics, manufacturing, service systems scheduling, and supply-chain management. Decision models: linear programming and sensitivity analysis, transportation and assignment, network models and algorithms, and integer, dynamic and nonlinear programming. Cross-listed with ENGR 770.

IME 771. Probabilistic and Deterministic Methods. 3 Credits.
Applications modeling. Domains include transportation, logistics, manufacturing, service systems scheduling, and supply-chain management. Quantitative models and tools include Markov chains, stochastic processes, queuing, deterministic and stochastic decision analysis, time series, forecasting, and regression modeling. Prereq: IME 660. Cross-listed with ENGR 771.

IME 774. Neural Networks. 3 Credits.
Introduction to the parallel processing paradigms that have been developed recently including neuronetworks and genetic algorithms. Students will work on projects using these tools.

IME 775. Data Driven Modeling and Optimization. 3 Credits.
This course covers mathematical modeling and optimization fundamentals in the context of machine learning. Key areas include optimization basics, heuristics, data handling, interpretable machine learning models, and regression from an optimization perspective. It delves into Support Vector Machines and Large Language Models, along with the field of Natural Language Processing. Practical skills are developed through coding exercises and a hands-on project, combining theory with application.

IME 777. Graph Data Analytics. 3 Credits.
This course covers data analytics and machine learning (ML) with graph data structures, focusing on node, edge, and graph embedding, and representation learning. It includes descriptive network analysis, traditional ML on graphs, and graph neural networks. Practical aspects of the course involve coding for network analysis and ML. The course also features contemporary topic presentations by students and a hands-on project, blending theory with real-world application.

IME 780. Advanced Production and Inventory Control. 3 Credits.
Study of the theory and applications of production scheduling, inventory management, production planning, just-in-time production, and materials requirement planning. Prereq: IME 680. F (even years).

IME 790. Graduate Seminar. 1-3 Credits.

IME 791. Temporary/Trial Topics. 1-5 Credits.

IME 793. Individual Study/Tutorial. 1-5 Credits.

IME 795. Field Experience. 1-15 Credits.

IME 796. Special Topics. 1-5 Credits.

IME 797. Master's Paper. 1-3 Credits.

IME 798. Master's Thesis. 1-10 Credits.

IME 899. Doctoral Dissertation. 1-15 Credits.

Interior Design (ID)

ID 151. Design Fundamentals. 3 Credits.
Study and application of elements and principles of design; two- and three-dimensional applications. Prereq or Coreq: Students must be an Interior Design major.

ID 160. Interior Design Careers. 1 Credit.
Survey of the interior design profession and the relationship to allied professionals and organizations.

ID 161. Technical and Graphic Communications. 3 Credits.
Fundamentals of building construction, materials, and methods. Technical and graphic communication for interior design documentation. Prereq or Coreq: Students must be a Pre-Interior Design or BS/BA Interior Design major.

ID 251. Residential Studio. 3 Credits.
Introduction of design theory and process to analyze interior environments. Emphasis on programming and space planning. Prereq: ID 261 and ID 265 with a grade of C or higher. Prereq or Coreq: Interior Design major with a minimum of 3.00 cumulative GPA.

ID 253. Small Scale Contract Studio. 3 Credits.
Application of design theory and process to analyze small contract environments. Emphasis on programming, schematics, design development, human factors, and construction documentation of commercial environments. Prereq: ID 251 and ID 264 with a grade of C or higher. Prereq or Coreq: Interior Design major with a minimum of 3.00 cumulative GPA.

ID 261. Visual Communications. 3 Credits.
Introduction to visual elements used to convey ideas and information by applying principles and methods of visual communication, emphasis on presentation layout, use of 3D modeling software, and real-time rendering programs. Prereq: ID 151 and ID 161 each with a grade of C or higher. Prereq or Coreq: Students must be a Pre-Interior Design or BS/BA Interior Design major with a minimum cumulative GPA of 3.0.

ID 264. Residential Systems. 2 Credits.
Introduction of basic principles of lighting design and interior systems in residential applications. Prereq: ID 261 and ID 265 both with a grade of C or higher. Prereq or Coreq: Students must be Interior Design majors with a minimum cumulative 3.0 GPA.

ID 265. CADD for Interiors. 3 Credits.
Computer-aided design and drafting, emphasizing applications in interior design. Includes drawing creation, editing layers, blocks, and attributes. Prereq: ID 151 and ID 161 each with a grade of C or higher Prereq or Coreq: Students must be a Pre-Interior Design or BS/BA Interior Design major with a minimum cumulative GPA of 3.0.

ID 315. History of Interiors I. 3 Credits.
Survey of historical interiors and furnishings beginning with antiquity through the 1800's. F.

ID 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.

ID 351. Advanced Residential Studio. 3 Credits.
Application of design components to an advanced residential project with emphasis on special populations and design focus. Prereq: ID 253, ID 363 and ID 368 with a grade of C or higher. Prereq or Coreq: Student must be Interior Design major with a minimum cumulative 3.0 GPA.

ID 353. Large Scale Contract Design Studio. 3 Credits.
Application of design theory and process to large-scale contract environments. Emphasis on wellness in design. Application of laws, codes, standards, and building systems influencing human experience in the interior environment. Prereq: ID 351, ID 460, and ID 461 each with a grade of C or higher Prereq or Coreq: Students must be Interior Design majors with a minimum cumulative GPA of 3.0.

ID 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: ID 251 and ID 264 both with a grade of C or higher Prereq or Coreq: Students must be Interior Design majors with a minimum cumulative GPA of 3.0.

ID 368. Interior Materials. 4 Credits.
This course examines the characteristics, applications, specifications and sustainability of materials used in interior spaces. The lab portion focuses on management of resources used by interior designers, including references, product information, and material samples.

ID 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: ID 353 and ID 461 with a grade of C or higher and students must be Interior Design majors with a minimum cumulative GPA of 3.0.

ID 451. Professional Interior Design Seminar. 2 Credits.
Advanced professional interior design seminar resulting in direct client interface and project deliverables. May be repeated. Prereq: Accepted into the interior design program.

ID 452. Comprehensive Interior Design Project. 6 Credits.
Capstone design studio. Student defined problem. Synthesis and implementation of previous course work. S.

ID 460. Career Development and Professional Practice. 3 Credits.
Overview of professional standards and promotional activities as related to the interior design profession. Prereq: ID 253, ID 363 and ID 368 with a grade of C or higher. Prereq or Coreq: Students must be Interior Design majors with a minimum cumulative GPA of 3.0.

ID 461. Building Information Modeling. 3 Credits.
Computer-aided design, modeling and rendering emphasizing applications in interior design. Prereq: ID 253, ID 363 and ID 368 with a grade of C or higher Prereq or Coreq: Students must be Interior Design majors with a minimum cumulative GPA of 3.0.

ID 462. Pre-Internship Development. 1 Credit.
Internship and career development skills (self-assessment, resume writing, interviewing, and correspondence) to prepare design students for professional practice. Prereq: ID 351, ID 460, ID 461 each with a grade of C or higher. Prereq or Coreq: Students must be Interior Design major with a minimum cumulative GPA of 3.0.

ID 491. Seminar. 1-5 Credits.

ID 494. Individual Study. 1-5 Credits.

ID 496. Field Experience. 1-15 Credits.

ID 705. Interdisciplinary Perspectives in Environments for Aging. 3 Credits.
This course overviews theoretical perspectives in environments for aging, as well as factors involved in the continuum of environments for aging including aging in place, retirement communities, long term care, memory care, and end of life care. Students will be introduced to a wide range of overlapping domains such as environmental psychology, cognitive science, sociology, physiology, architectural and interior design, human geography and urban/rural planning. Prereq: Graduate student standing in HSE or Psychology.

International Studies (INTL)

INTL 110. Introduction to International Studies. 3 Credits.
An interdisciplinary course which introduces students to a variety of global topics, concepts, and perspectives.

INTL 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

INTL 394. Individual Study. 1-5 Credits.

INTL 401. Life and Politics of US-Mexico Borderlands. 3 Credits.
This course is designed to help students access a greater understanding of the political and cultural realities of the US-Mexico Borderlands through academic texts, literature, pop culture, and history. This is a reading intensive course.

INTL 488. Integrated Senior Project Proposal. 1 Credit.
This course is designed to provide an opportunity for students in the International Studies major to develop their Integrative Senior Project in collaboration with their peers and NDSU faculty.

INTL 489. Integrative Senior Project. 2 Credits.
This course involves the independent research and writing of an integrative senior project paper which will serve as the capstone of the International Studies major. Prereq: INTL 488 and International Studies majors only.

INTL 494. Individual Study. 1-5 Credits.

INTL 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

Landscape Architecture (LA)

LA 172. Environmental Design II. 3 Credits.
Introduction to design studio, with practice in representational media, techniques and skills exploring drawing, visual abstraction, visual literacy relating to environmental design problem-solving, visual resolution of form and proportion, and graphic communication.

LA 191. Seminar. 1-3 Credits.

LA 192. Study Abroad. 1-15 Credits.

LA 194. Individual Study. 1-5 Credits.

LA 199. Special Topics. 1-5 Credits.

LA 231. Digital Media + Methods Technology. 3 Credits.
Introductory study of digital technology applications and processes within Landscape Architecture. Course focus towards digital creation and production methods including the introduction of common printing and fabrication devices. Prereq: Environmental Design or Architecture major.

LA 271. Landform + Spacemaking Design Studio. 6 Credits.
A sequence of hands-on small-scale design exercises to enable students to appreciate the media of the landscape - landform, plants, water, and structure- as an evocative component in the landscape design vocabulary of problem-solving, concept formation, site inventory and analysis, and programming. Prereq: Environmental Design major or minor.

LA 291. Seminar. 1-3 Credits.

LA 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

LA 294. Individual Study. 1-5 Credits.

LA 299. Special Topics. 1-5 Credits.

LA 321. History of Landscape Architecture. 4 Credits.
Survey of landscape design from prehistoric civilizations, Rome, the Renaissance, Asian landscapes, the birth of landscape architecture, and contemporary design movements. Emphasis on analyzing historic landscapes as a problem-solving method.

LA 332. Digital Drawing + Representation Technology. 3 Credits.
Intermediate exploration into computer applications and digital design techniques as related to Landscape Architecture. Course emphasis on digital drawing methods, modeling processes and professional presentation practices. Prereq: LA 231.

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 374. Park + Open Space Design Studio. 6 Credits.
Design and concept development strategies in the context of both urban and rural open space systems, and behavioral configurations. Intermediate problem solving through two and three-dimensional graphics techniques; continued oral and written communication skills. Prereq: Environmental Design major, LA 271.

LA 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

LA 391. Seminar. 1-3 Credits.

LA 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

LA 394. Individual Study. 1-5 Credits.

LA 396. Field Experience. 1-15 Credits.

LA 399. Special Topics. 1-5 Credits.

LA 421. Planting Design: Theory + Research. 3 Credits.
This course broadens applicable knowledge of an array of approaches in planting design using examples of iconic contemporary landscapes. This course is a blend of lectures, readings, discussions, and research that introduce history, theory, and methods of professional planting design. This is a spatial and ecological study of planting design at various scales and ecosystems. {Also offered for graduate credit - see LA 621.}.

LA 431. Advanced Digital Applications + Analysis Technology. 3 Credits.
Advanced investigation into technology software and methods as applied towards the profession of Landscape Architecture. Course emphasis in complex computer modeling, analytical methods, and innovative design software. Prereq: LA 332. {Also offered for graduate credit - see LA 631.}.

LA 442. Advanced Grading + Drainage. 4 Credits.
Intermediate exploration into site engineering and construction practices within Landscape Architecture. Course emphasis towards proficient site grading, stormwater management calculations, and design communication practices. Prereq: LA 341. {Also offered for graduate credit - see LA 642.}.

LA 444. Advanced Construction Drawing + Documentation. 4 Credits.
An advanced exploration into the materials, methods, and applications of construction detailing within Landscape Architecture. Course emphasis in the development of technical details, preparation of construction drawings, and use of computer-aided software. Prereq: LA 442. {Also offered for graduate credit - see LA 644.}.

LA 471. Site Elements + Composition Design Studio. 6 Credits.
Intermediate exploration of research methods and site scale design development approaches as related to Landscape Architecture. Studio focus on project programming, site development, design detailing, and communication techniques. Course includes a field trip. Prereq: LA major, LA 372.

LA 472. Advanced Community Planning + Design Studio. 6 Credits.
Design strategies based on the complex behavioral interactions of people with the restorative components of the landscape environment to address contemporary life challenges for promoting people's health and ensuring well-being in the built environment for site-specific local and accessible projects at the community and neighborhood-scale such as mixed-use housing and commercial, elderly communities, university campuses. Prereq: LA major, LA 471.

LA 475. City-Shaping Design Studio. 6 Credits.
Regional to neighborhood scale investigation of urban design theories, systems, and planning practices as related to Landscape Architecture. Focus on streetscapes and bicycle and pedestrian facility analysis and problem-solving strategies through written, graphical, and modeling studies. Prereq: LA 472. {Also offered for graduate credit - see LA 675.}.

LA 476. Ecological Design Studio. 6 Credits.
Regional to site-scale study exploring the ecological processes and cultural systems within Landscape Architecture. Studio emphasis towards the application of the full design development process, from problem definition to construction detailing, as a comprehensive advanced-level project. {Also available for graduate credit - see LA 676.}.

LA 491. Seminar. 1-5 Credits.

LA 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

LA 494. Individual Study. 1-5 Credits.

LA 496. Field Experience. 1-15 Credits.

LA 499. Special Topics. 1-5 Credits.

LA 563. Programming and Thesis Preparation. 3 Credits.
Discussion and application of a comprehensive design process for production of the design thesis. Emphasis on preparing a design program. Prereq: LA 472.

LA 571. Environmental Planning Studio. 6 Credits.
Environmental systems development and implementation of a complex design problem. Emphasis on landscape architecture design development through graphic, computer, and modeling techniques. Studio. Prereq: LA major, LA 472. Coreq: LA 563.

LA 572. Design Thesis. 8 Credits.
Capstone opportunity as a culmination of design education. Student generated design topic is fully developed and realized from master planning through design development, detailing, and documentation. Prereq: LA 563, LA 571.

LA 581. Professional Practice. 3 Credits.
Study of contemporary architectural practice covering professional development, firm organization, and project management within the context of the ethical, legal, and regulatory environment. Cross-listed with ARCH 681. Prereq: LA 472.

LA 590. Seminar. 1-5 Credits.

LA 593. Individual Study/Tutorial. 1-5 Credits.

LA 596. Special Topics. 1-5 Credits.

LA 621. Planting Design: Theory + Research. 3 Credits.
This course broadens applicable knowledge of an array of approaches in planting design using examples of iconic contemporary landscapes. This course is a blend of lectures, readings, discussions, and research that introduce history, theory, and methods of professional planting design. This is a spatial and ecological study of planting design at various scales and ecosystems. {Also offered for undergraduate credit - see LA 421.}.

LA 631. Advanced Digital Applications + Analysis Technology. 3 Credits.
Advanced investigation into technology software and methods as applied towards the profession of Landscape Architecture. Course emphasis in complex computer modeling, analytical methods, and innovative design software. {Also offered for undergraduate credit - see LA 431.}.

LA 642. Advanced Grading + Drainage. 4 Credits.
Intermediate exploration into site engineering and construction practices within Landscape Architecture. Course emphasis towards proficient site grading, stormwater management calculations, and design communication practices. {Also offered for undergraduate credit - see LA 442.}.

LA 644. Advanced Construction Drawings + Documentation. 4 Credits.
An advanced exploration into the materials, methods, and applications of construction detailing within Landscape Architecture. Course emphasis in the development of technical details, preparation of construction drawings, and use of computer-aided software. {Also offered for undergraduate credit - LA 444.}.

LA 675. City-shaping Design Studio. 6 Credits.
Regional to neighborhood scale investigation of urban design theories, systems, and planning practices as related to Landscape Architecture. Focus on streetscapes and bicycle and pedestrian facility analysis and problem-solving strategies through written, graphical, and modeling studies. {Also offered for undergraduate credit - see LA 475.}.

LA 676. Ecological Design Studio. 6 Credits.
Regional to site-scale study exploring the ecological processes and cultural systems within Landscape Architecture. Studio emphasis towards the application of the full design development process, from problem definition to construction detailing, as a comprehensive advanced-level project. Prereq: LA 675. {Also offered for undergraduate credit - see LA 476.}.

LA 722. Landscape Theory, Research, + Scholarly Methods. 3 Credits.
Discussion on how landscape architectural discourse enables critical thinking, enhances synthetic design skills, and interweaves research and design processes. Emphasis on research methodologies and writing to produce the design thesis. Prereq: LA major or minor.

LA 763. Landscape Architecture Thesis Research & Programming. 3 Credits.
An application of research methodologies and the research required to complete a design thesis in a first professional degree program in Architecture at the graduate level. Completion of a Thesis Proposal and a Thesis Research document in preparation for the Design Thesis Studio to follow.

LA 771. Performance Based Design Studio. 6 Credits.
Design of sustainable sites and quality communities with themes that promote the approach of parametric and data driven design in landscape architecture. Strategies, technologies, metrics tools, and practices regarding evaluating site performances will be introduced. Prereq: LA 472, LA 441.

LA 772. Landscape Architecture Graduate Thesis. 6 Credits.
Student generated design solution assimilating the theoretical, social, environmental, technical and ethical practices of Landscape Architecture. Advanced exploration into research/analysis, design development and presentation methods as a culmination of graduate education. Prereq: LA 771.

LA 781. Professional Practice. 3 Credits.
Study of contemporary landscape architectural practice covering professional development, firm organization, project management, SITES 2.0 within the context of the ethical, legal, sustainable, and regulatory environment. Prereq: LA 472.

LA 789. Professional Topics in Landscape Architecture. 3 Credits.
Various topics related to theoretical or methodological aspects of landscape architecture as a professional discipline. May be repeated. Prereq: Students must be Architecture or Landscape Architecture majors only.

LA 795. Field Experience. 1-10 Credits.

LA 796. Special Topics. 1-5 Credits.

Management (MGMT)

MGMT 141. Travel Management. 3 Credits.
Application of management principles and theories to tourism with emphasis on tourism components, recreational activities, international travel, and social, economic, and environmental impacts of the global tourism industry. This course provides fundamental knowledge of tourism impacts, global events and trends, destination management, tourist behaviors, and tourism marketing. This course is open to students pursuing any major.

MGMT 241. Event Management. 3 Credits.
This course explores the multidisciplinary nature of events management and provides the student with professional knowledge they need in order to succeed in the events industry. This course is open to students pursuing any major.

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 major or minor, and a 2.50 minimum NDSU grade point average.

MGMT 330. Foundations of Organizational Behavior. 3 Credits.
A behavioral approach to management with emphasis on the understanding of individual behavior in groups in organizations. Topics include motivation, communication, perception, and cultural diversity. Prereq: MGMT 320. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

MGMT 394. Individual Study. 1-5 Credits.

MGMT 430. Leadership in Organizations. 3 Credits.
A comprehensive study of the principles, practices, and challenges of contemporary leadership and followership. Prereq: MGMT 320. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 630.}.

MGMT 434. Leading Virtual Teams. 3 Credits.
The recent advances in technologies and the growth of multi-national operations make leading virtual teams an essential skill for leaders to develop a high-performance team. In this course, students will acquire the theoretical and practical tools to lead a virtual team effectively. Prereq: MGMT 320. Prereq or Coreq: College of Business major, minor, or certificate and a 2.50 minimum NDSU grade point average.

MGMT 436. Ethical Leadership. 3 Credits.
Leaders often encounter the need to make decisions in the face of conflicting personal, organizational, and societal value sets. In this course, we examine the interconnectedness of leadership and ethics by addressing questions such as: What are ethical leaders, what do they do, and how do they do it? How are values and ethics formed in individuals and organizations? What are the responsibilities of leaders to establish ethics and values in their organizations? Are there tensions that exist between ethics and leadership? What tools and skills should leaders develop to address ethical dilemmas in organizations? The courses gives students relevant theoretical and practical knowledge related to ethics and provides strategies to help students develop as ethical leaders who understand their own values and how to apply them to complex ethical situations in organizations. Prereq or Coreq: College of Business major, minor or certificate and a 2.50 minimum NDSU grade point average.

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 major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 640.}.

MGMT 441. Events Experience and Planning. 3 Credits.
This course provides a comprehensive overview of event experiences and the processes involved in their generation. It covers the roles and responsibilities of event professionals. Practical examples, cases, and assignments from the event industry will be incorporated for a hands-on understanding. Prereq: MGMT 241 and MGMT 320. Prereq or Coreq: Restricted to College of Business major, minor, or certificate and a 2.50 minimum NDSU grade point average.

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 major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 650.}.

MGMT 451. Negotiations. 3 Credits.
An exploration of negotiation and conflict settlement in interpersonal, business, and international settings. Topics include techniques used in negotiations, conflict resolution, and mediation. Prereq or Coreq: College of Business major, minor, or certificate and a 2.50 minimum NDSU grade point average and restricted to Jr or Sr classification. Dual-listing: 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 major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 652.}.

MGMT 453. Understanding and Managing Diversity in Organizations. 3 Credits.
Use of case analysis and experiential learning to consider the theoretical perspectives and practical implications of different forms of diversity at three management levels: personal values and actions; group dynamics; institutional policies and practices. Prereq: MGMT 320. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

MGMT 454. Labor-Management Relations. 3 Credits.
Analysis of human resource management in the presence of labor unions. Topics include: labor history, labor law, organizing unions, contract negotiation and administration, contract dispute resolution, labor-management cooperation, and strikes. Prereq: MGMT 320. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 654.}.

MGMT 470. Entrepreneurship/Small Business Management. 3 Credits.
A comprehensive entrepreneurship/small business course that examines entrepreneurial ideas, processes, individuals; new venture creation and growth (including franchises and family business); and application of management, marketing, and finance tools to the small business context. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

MGMT 471. Leading Social Entrepreneurship and Nonprofit Organizations. 3 Credits.
This course covers theories, tools, and perspectives for leading and managing social entrepreneurship and nonprofit organizations. This course provides frameworks and case examples to help students on their journey to becoming the leaders we need, leaders who can take action from a place of systems understanding. We explore similarities and differences between nonprofits and business firms, discuss current and controversial issues in the nonprofit sector, and emphasize practical applications for nonprofit leadership in managerial, staff, and volunteer roles. Prereq or Coreq: College of Business major, minor, or certificate and a 2.50 minimum NDSU grade point average. Dual-listing: MGMT 671.

MGMT 472. Managing Family Enterprises. 3 Credits.
A comprehensive family business course that examines governance, conflict management, succession, and topics pertinent to family businesses. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

MGMT 494. Individual Study. 1-5 Credits.

MGMT 496. Field Experience. 1-15 Credits.

MGMT 499. Special Topics. 1-5 Credits.
A group study of the known and established literature of a field, or other evidence, for purposes of scholarly development.

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. Negotiations. 3 Credits.
An exploration of negotiation and conflict settlement in interpersonal, business, and international settings. Topics include techniques used in negotiations, conflict resolution, and mediation. Dual-listing: 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 Social Entrepreneurship and Nonprofit Organizations. 3 Credits.
This course covers theories, tools, and perspectives for leading and managing social entrepreneurship and nonprofit organizations. This course provides frameworks and case examples to help students on their journey to becoming the leaders we need, leaders who can take action from a place of systems understanding. We explore similarities and differences between nonprofits and business firms, discuss current and controversial issues in the nonprofit sector, and emphasize practical applications for nonprofit leadership in managerial, staff, and volunteer roles. Dual-listing: MGMT 671.

MGMT 696. Special Topics. 1-5 Credits.

MGMT 727. Organizational Change Management. 3 Credits.
Change management as the process of making either incremental improvements or radical changes to an organization for the purpose of enhancing both organizational and individual effectiveness. A multi-perspective systems viewpoint is employed, stressing pragmatic implications for leadership.

MGMT 752. Organizational Restructuring. 3 Credits.
This course aims to provide students with a fundamental understanding of organizational design and restructuring, and exposes them to a broad range of activities-involved organizational restructuring, 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.

MGMT 893. Individual Study/Tutorial. 1-5 Credits.

Management Information Systems (MIS)

MIS 194. Individual Study. 1-5 Credits.

MIS 196. Field Experience. 1-15 Credits.

MIS 199. Special Topics. 1-5 Credits.

MIS 291. Seminar. 1-3 Credits.

MIS 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MIS 294. Individual Study. 1-5 Credits.

MIS 299. Special Topics. 1-5 Credits.

MIS 315. System Analysis and Design. 3 Credits.
Introduction to the front end of the software development life cycle. Includes various modern concepts, techniques, and tools for analyzing and designing well-structured software systems. Prereq: Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

MIS 320. Management Information Systems. 3 Credits.
Introduction to basic concepts and developments in information technology. Overview of the opportunities and challenges in the development and management of organizational information systems from a socio-technical perspective. Prereq: CSCI 116 or MIS 116 or TL 116. Restricted to College of Business major, minor, or certificate 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: TL 116 or CSCI 114.

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 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 and restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

MIS 376. Data and Telecommunications Administration. 3 Credits.
Introduction to a wide variety of topics in the voice and data communications field. Prereq: MIS 320 and Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

MIS 391. Seminar. 1-3 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

MIS 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MIS 394. Individual Study. 1-5 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

MIS 397. Fe/Coop Ed/Internship. 1-4 Credits.

MIS 399. Special Topics. 1-5 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

MIS 413. MIS Service Internship. 3 Credits.
Supervised professional information technology experience in a non-paid position. Offered on a Pass/Fail basis only.

MIS 450. Enterprise Systems. 3 Credits.
Introduction to the theoretical and practical issues related to the application of enterprise systems within organizations. Prereq: MIS 320. Prereq or Coreq: Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. Dual-listing: MIS 650.

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 320 and restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

MIS 479. Business Data Mining and Predictive Analytics. 3 Credits.
Information system support and modeling of the decision-making process via business data analytics techniques such as decision trees, cluster analysis, and neural networks are the primary focus of this course. The state-of-the-art technologies in business data analytics will be explored. Dual-listing: MIS 679.

MIS 491. Seminar. 1-5 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

MIS 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MIS 494. Individual Study. 1-5 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

MIS 496. Field Experience. 1-15 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

MIS 499. Special Topics. 1-5 Credits.
Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

MIS 650. Enterprise Systems. 3 Credits.
Introduction to the theoretical and practical issues related to the application of enterprise systems within organizations. Prereq: College of Business major or minor and a 2.50 minimum NDSU grade point average. Dual-listing: MIS 450.

MIS 679. Business Data Mining and Predictive Analytics. 3 Credits.
Information system support and modeling of the decision-making process via business data analytics techniques such as decision trees, cluster analysis, and neural networks are the primary focus of this course. The state-of-the-art technologies in business data analytics will be explored. Dual-listing: MIS 479.

MIS 705. Programming for Business Analytics. 2 Credits.
The course introduces the basics of programming languages required to perform tasks in the business analytics workflow, such as data cleansing, data transformation, data visualization, and predictive analytics modeling. Prereq: Admission into the MSBA program or permission of the MSBA program director.

MIS 710. Database Management. 2 Credits.
This course provides a foundational understanding of the management, conceptualization, development, and implementation of databases. It covers normalization, structured query language (SQL), distributed databases, and conceptual modeling using entity-relationship (ER) diagrams. Case examples of modeling data in an organizational context will be utilized. Prereq: Open to MSBA students or with permission of the instructor.

MIS 720. Visualization and Reporting. 2 Credits.
This course provides advanced usage of quantitative analysis using spreadsheets, in-memory database, and development of effective dashboards. Emphasis is on the application of theoretical understanding of the human interaction with the user interface to facilitate communication and story-telling using data. Effectively communicating analysis results to a management and business audience using dashboards and reports to enhance decision-making is examined. Prereq: Open to MSBA students or with permission of instructor.

MIS 740. Advanced Business Analytics Methods. 2 Credits.
This course develops an understanding of practical applicability of advanced analytics methods in a variety of business scenarios. The course is designed to provide hands-on opportunities for students to work with data and apply advanced business analytics techniques and machine learning, which include text mining, natural language processing, web analytics, social analytics, and simulation. Prereq: MBA 753 and open to MSBA students or with permission of the instructor.

MIS 770. Information Technology Audit and Risk Management. 3 Credits.
Role of information resources in supporting organizational functions by providing an accounting perspective on use, design, and evaluation of information systems; use of information technologies for making and communicating decisions, and interacting with business functions.

MIS 790. Graduate Seminar. 1-5 Credits.

MIS 793. Indiv Study/Tutorial. 1-5 Credits.

MIS 795. Field Experience. 1-15 Credits.

MIS 796. Special Topics. 1-5 Credits.

Marketing (MRKT)

MRKT 320. Foundations of Marketing. 3 Credits.
Survey of the four basic areas of marketing: product, price, place, and promotion. Exposure to consumer behavior and strategic marketing from an international perspective. Restricted to College of Business 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 350. Creativity and Innovation. 3 Credits.
This course focuses on understanding the role of creativity in developing innovative products, services, and solutions. Students will learn the value of systematic creativity through human-centered problem-solving processes when applied to developing innovations in multiple contexts. Prereq or Coreq: College of Business major, minor, or certificate and a 2.50 minimum NDSU grade point average.

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 major or minor and a 2.50 minimum NDSU grade point average.

MRKT 372. Global Retailing. 3 Credits.
Theoretical approach to management practices and marketing policies for retail soft goods in a complex and changing world market. ARMD 372 is restricted to Apparel, Retail Merchandising and Design or Hospitality and Event Management major or minor. MRKT 372 is restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. Prereq: MRKT 320 or ARMD 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 major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MRKT 610.}.

MRKT 420. Advertising and Integrated Marketing Communication. 3 Credits.
Examination of the use of advertising as part of the worldwide marketing function; prepares the student to analyze and plan integrated marketing communication campaigns. Prereq: MRKT 320. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MRKT 620.}.

MRKT 430. Sales and Personal Selling. 3 Credits.
Examination of the theoretical frameworks, principles, and the methods related to sales and the personal selling process. Co-req: MRKT 320. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - See MRKT 630.}.

MRKT 432. Entrepreneurial Sales. 3 Credits.
This course will focus on building a sales plan within a new organization, the foundational skills of selling, and will explore a consultative-based sales approach. Students will learn skills in five specific areas: interpersonal skills, communication skills, presentation skills, facilitation skills, and problem-solving skills. These skills will be taught and discussed in the context of entrepreneurial sales through real life examples, case studies, and role play scenarios. Students will learn about the dynamics of a sales meeting, how to be more persuasive, and how to look for win-win opportunities all in the context of a startup. They will learn how to leverage their resources and how to differentiate themselves in the sales process. Prereq: MRKT 320. Prereq or Coreq: College of Business major, minor, or certificate and a 2.50 minimum NDSU grade point average.

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 and 430 and College of Business major or minor and a 2.50 minimum NDSU grade point average. {Also offered as a graduate course: MRKT 634.}.

MRKT 436. Advanced Professional Selling. 3 Credits.
This course focuses on advanced professional selling frameworks, common methodologies, and gaining a deep understanding of buyer decision making involved in the sales process. Students will expand their skills in the areas of interpersonal, communication, presentation, facilitation, analytics, and problem-solving. These skills will be taught through lectures and outside speakers and practiced through case studies and complex role play scenarios. Prereq: MRKT 320 and MRKT 430 and a cumulative 2.50 NDSU GPA. Prereq or Coreq: Restricted to students in the Certificate of Professional Selling or Minor in Professional Selling program.

MRKT 438. Customer Relationship Management (CRM) and Sales Technology. 3 Credits.
Introduction to principles of customer relationship management, sales automation, and use of different technologies in professional sales. Prereq: MRKT 320. Prereq or Coreq: College of Business major, minor, or certificate and a 2.50 minimum NDSU GPA.

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 major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MRKT 640.}.

MRKT 450. Marketing Research. 3 Credits.
Study of marketing research methods with focus on research design, data collection, and analysis techniques. Prereq: MRKT 320, STAT 331 and MATH 144 or MATH 146. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MRKT 650.}.

MRKT 460. Marketing Strategy. 3 Credits.
The analysis, planning, implementation, and control of worldwide marketing programs to achieve an organization's objectives including an examination of the progress of the Internet for the marketing of goods and services. Prereq: MRKT 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MRKT 465. Digital Marketing. 3 Credits.
This course focuses on understanding, managing and analyzing an organization's digital marketing strategy. Topics related to online business models, search engine optimization, paid search and display advertising, web analytics, email marketing, social media and mobile marketing, reputation management and online retailing will be considered. Prereq: MRKT 320 and College of Business major or minor and a 2.50 minimum NDSU grade point average.

MRKT 466. Digital Marketing Analytics. 3 Credits.
This course focuses on the measurement, collection, analysis and reporting of web or digital data for the purpose of understanding, managing, and optimizing digital marketing efforts of an organization. In the course, students will learn about the digital analytics process, digital data visualization methods, online experimentation, methods for analysis of digital marketing data, and text analytics to understand and manage social media. Prereq or Coreq: Student must have a minimum 2.50 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 major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MRKT 670.}.

MRKT 494. Individual Study. 1-5 Credits.

MRKT 497. FE/Coop Ed/Internship. 1-15 Credits.

MRKT 499. Special Topics. 1-5 Credits.

MRKT 610. Consumer Behavior. 3 Credits.
Examination of dimensions of consumer buying theories. Aimed at understanding the buying behavior of customers. {Also offered for undergraduate credit - see MRKT 410.}.

MRKT 630. Sales and Personal Selling. 3 Credits.
Examination of the theoretical frameworks, principles, and the methods related to sales and the personal selling process. {Also offered for undergraduate credit - see MRKT 430.}.

MRKT 634. Sales Management. 3 Credits.
This course provides students with a basic understanding of functions, tasks, and decisions involved in sales management. Specific topics include planning, organizing, implementing, and monitoring and controlling the sales effort. {Also offered as an undergraduate course: MRKT 434.}.

MRKT 640. International Marketing. 3 Credits.
Focused on identifying and satisfying global customer needs better than the competition, both domestic and international, and coordinating marketing activities within the context of the global environment. {Also offered for undergraduate credit - see MRKT 440.}.

MRKT 650. Marketing Research. 3 Credits.
Study of marketing research methods with focus on research design, data collection, and analysis techniques. {Also offered for undergraduate credit - see MRKT 450.}.

MRKT 670. Services Marketing. 3 Credits.
This course focuses on management and strategic issues as they relate to the marketing of services. {Also offered for undergraduate credit - see MRKT 470.}.

MRKT 696. Special Topics. 1-5 Credits.

MRKT 793. Individual Study. 1-5 Credits.

Master of Business Administration (MBA)

MBA 701. Strategic Cost Management. 2 Credits.
This course introduces managerial accounting for decision making and control in profit-directed organizations. It also defines product costing, budgetary control systems, and performance evaluation systems for planning, coordinating, and monitoring the performance of a business. Students will understand how modern organizations use managerial accounting to effectively plan and control operations and make sound business decisions. Prereq: Admission to MBA program.

MBA 702. Advanced Financial Management. 2 Credits.
In-depth coverage of concepts and decision-making tools in financial analysis, cost of capital, capital structure, capital budgeting, and dividend policy through analyzing competitive situations and developing strategic views of key financial dimensions. Prereq: Admission to MBA program.

MBA 703. Advanced Organizational Behavior. 2 Credits.
This course is intended to introduce you to the essentials of the most important organizational behavior concepts and principles through instruction, reading, cases, and experience. The course focuses on practical and useful information and skills which will aid you in managing and working in an organization. The course will use evidence-based research to examine and explore the relationship between individual, team, and organizational characteristics and individual outcomes. Prereq: Admission to MBA program.

MBA 704. Supply Chain and Operations Management. 2 Credits.
Study of analysis and decision-making directed at creating, producing, and bringing goods and services to market under uncertain business conditions. Includes techniques from project management, supply chain management, quality management, inventory management, forecasting, and productions planning. Prereq: Admission to MBA program.

MBA 705. Strategic Marketing Management. 2 Credits.
Focus on the conceptual framework, managerial approach and analysis of deploying marketing resources to communicate and deliver value. Prereq: Admission to MBA program.

MBA 706. Managing Information Resources. 2 Credits.
Managerial perspectives on the role of information resources in supporting organizational functions including the strategic use of information systems; use, design, and evaluation of information resources; use of information technologies for managerial decision making, and IT support of different and business functions. Prereq: Admission to the MBA program.

MBA 707. Microeconomics for Managers. 2 Credits.
This course will provide students with an understanding of microeconomic tools for managerial decision making. Students will learn how to use an understanding of economics to make better value maximization decisions for their company. Course topics will include supply/demand principles, demand elasticity and estimation, production and costs, market structure, strategic interaction, complex pricing problems, and decisions under risk. Prereq: Admission to MBA program.

MBA 708. Advanced Strategic Management. 2 Credits.
This course teaches from the perspective of top management, integrating functional business expertise into analysis of the firm's internal resources and capabilities with analysis of the external environment in which the firm competes, to enable formulation and implementation of company strategy. Prereq: MBA 701, MBA 702, MBA 703, MBA 704, MBA 705, MBA 706.

MBA 711. Advanced Investment Analysis. 2 Credits.
This course provides students with a fundamental understanding of investments and the theory and practice of financial valuation. Students will learn how to value a publicly listed company after identifying key internal and external investment factors. Students will deliver a detailed research recommendation on a stock investment idea. Students will use Bloomberg terminals in the Commodity Trading Lab to gain hands-on experience through valuation analysis and have the opportunity to participate in the Student Managed Investment Fund (Bison Fund). This course will also be useful for students who are planning to take the CFA (Chartered Financial Analyst) exams. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 712. Advanced Portfolio Management. 2 Credits.
This course provides students with a fundamental understanding of investments and the theory and practice of modern portfolio management. Students will gain in-depth knowledge of portfolio construction and performance evaluation. Students will use Bloomberg terminals in the Commodity Trading Lab to gain hands-on experience through portfolio management and have the opportunity to participate in the Student Managed Investment Fund (Bison Fund). Students will deliver a written report and detailed presentation of their portfolio results. This course will also be useful for students who are planning to take the CFA (Chartered Financial Analyst) exams. Prereq:Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 713. Financial Derivatives. 2 Credits.
This course is designed to enable students to understand the nature and functions of financial derivatives, including the various futures and options contracts. It covers the role of derivatives markets, the characteristics of derivative products, pricing methodology, and trading strategy of derivatives.

MBA 714. Financial Analysis and Valuation. 2 Credits.
The goal of this course is to develop MBA students' ability to use financial information and related disclosures to evaluate the underlying economics of a firm. This course covers the theory and practice of financial analysis and valuation, and particularly focuses on the analysis, interpretation and prediction of firm financial performance, such as profitability and risks, operating and non-operating cash flows, and management of strategic financing and investing. Prereq: Admission to the MBA program.

MBA 721. Creating and Marketing Innovations. 2 Credits.
This course focuses on creating and enhancing customer value though new products and services. Students will learn the value of new product strategy and new product development process from opportunity identification to launch. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 722. Marketing Analytics and Customer Intelligence. 2 Credits.
This course takes a very hands-on approach with customer intelligence and equips students with the marketing science understanding and techniques they need to solve real-world marketing challenges. This course uses a combination of lectures, cases, and exercises. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 723. Digital Marketing. 2 Credits.
This course focuses on understanding, managing and analyzing an organization's digital marketing strategy. Topics related to online business models, search engine optimization, paid search and display advertising, web analytics, email marketing, social media marketing and reputation management will be considered. Prereq: Admission to the MBA program.

MBA 724. Integrated Marketing Communications. 2 Credits.
This course focuses on marketing communications management in terms of strategy development, implementation, and evaluation. It examines the effects of changing environmental circumstance on integrated marketing communications and promotional strategy - budget allocation, messages, and media vehicles adopted. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 731. Leading and Managing Teams. 2 Credits.
This course is designed to prepare students to effectively develop, lead, and manage teams. We will examine and practice team development. We will examine critical team processes and how to manage these processes. We will have the opportunity to practice both the management skills and leadership skills necessary to have effective collaboration among team members. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 732. Managerial Leadership: Essential Competencies. 2 Credits.
This course is designed to prepare graduate students for the role of being a managerial leader. We will examine and practice the essential competencies such as creating a compelling purpose, role clarification inspiration/motivation, problem solving, team building needed as a manager and a leader. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 733. Management Decision Making. 2 Credits.
This course provides tools and experiences to allow managers to become more sophisticated and effective decision makers. It examines logical processes relating to decision making, but also incorporates behavioral and organizational aspects of decision making. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 734. Negotiations. 2 Credits.
This course is designed to provide practical negotiating knowledge primarily through hands-on experiential exercises. Topics covered are useful to the practicing manager and readings and lectures are designed to reinforce lessons learned during actual negotiations. Some of the topics covered: using agents in negotiation, establishing value, distributive and integrative bargaining, working across diverse contexts, and employing (and defending) against common negotiation tactics. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 735. Global Business. 2 Credits.
This course exposes students to economic, financial, marketing, and strategic views of international business to enable students to better understand the challenges and opportunities firms face competing in the global business arena. Prereq: Admission to the MBA program.

MBA 736. Managing Conflict in Organizations. 2 Credits.
Study of conflict and conflict management in organizational contexts. Topics include conflict styles, conflict resolution, conflict management, conflict analysis, and positive and negative effects of conflict.

MBA 751. Business Analytics Concepts. 2 Credits.
This course covers important business data analytics concepts including data warehousing, OLAP, ETL, data mining, self-service business intelligence, and business reporting and visualization tools. It provides hands-on experience in the use of some popular data analytics software tools with a focus on aiding managerial decision-making across different business functional areas. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 752. Business Analytics Strategy. 2 Credits.
Case-based discussion course examining how data analytics impact organizations today and issues related to the development of an overall business data analytics organizational strategy. Topics include business data analytics in organizations and its impact on business functional areas, strategic use of data and information, ethical issues related to data collection and usage, social and legal implications of pervasive digitization, and management of intellectual property. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 753. Business Analytics Methods. 2 Credits.
This managerially-oriented course covers the use of analytic tools to generate predictive models such as logistic regression, decision trees, neural networks, and cluster analysis to generate deeper business insights in direct support of managerial decision making. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 793. Individual Study/Tutorial. 1-5 Credits.

MBA 796. Special Topics. 1-5 Credits.

MBA 893. Individual Study/Tutorial. 1-5 Credits.

Materials & Nanotechnology (MNT)

MNT 729. Materials Characterization. 3 Credits.
This course will cover basic techniques and methods for characterization of materials, x-ray diffraction and electron microscopy will be discussed in detail. Also covered will be spectroscopies, NMR, FTIR and RAMAN.

MNT 730. Nanotechnology and Nanomaterials. 3 Credits.
This course reviews principles of nanotechnology, nanomaterials and develops a framework for their understanding. The basic tools of nanotechnology; nanoscale characterization, physics and materials design will be discussed in the context of current engineering applications.

MNT 732. Physical Properties of Materials. 3 Credits.
Describes the fundamental science and engineering concepts that form the foundation of Materials and Nanotechnology, including statistical mechanics, quantum mechanics, condensed matter physics and chemical engineering.

MNT 745. Preparing Future Researchers. 1 Credit.
This course will involve presentations given by invited faculty from various academic institutions ranging from research oriented to teaching oriented and also R&D project leaders in companies.

MNT 756. Molecular Modeling. 3 Credits.
This course will cover basic fundamentals of molecular statics, molecular dynamics, Monte Carlo modeling techniques and allow students to be able to model complex lattice structures, structures of lattice defects, crystal surfaces, and interfaces.

MNT 760. Materials Synthesis Processing. 3 Credits.
This course deals with synthesis and processing issues in materials design.

MNT 790. Graduate Seminar. 1-5 Credits.

MNT 793. Individual Study. 1-5 Credits.

MNT 794. Practicum/Internship. 1-8 Credits.

MNT 798. Master's Thesis. 1-10 Credits.
Original investigation under the supervision of a major adviser and a supervisory committee. Graded S or U.

MNT 899. Doctoral Dissertation. 1-15 Credits.
Original investigation under the supervision of a major adviser and a supervisory committee. Graded S or U.

Mathematics (MATH)

MATH 098. Intermediate Algebra. 3 Credits.
Properties of the real number system, factoring, linear and quadratic equations, functions, polynomial and rational expressions, inequalities, systems of equations, exponents, and radicals. Offered through Continuing Education. Special fee required. Does not satisfy any requirements for graduation. A grade of C or higher is required in this course to be eligible to take MATH 103 or MATH 104.

MATH 103. College Algebra. 3 Credits.
Relations and functions, equations and inequalities, complex numbers; polynomial, rational, exponential and logarithmic functions; systems of equations, and matrices. Prereq: MATH 98 with a grade of C or higher or placement.

MATH 104. Finite Mathematics. 3 Credits.
Systems of linear equations and inequalities, matrices, linear programming, mathematics of finance, elementary probability and descriptive statistics. Prereq: MATH 98 with a grade of C or higher or placement.

MATH 105. Trigonometry. 3 Credits.
Angle measure, trigonometric and inverse trigonometric functions, trigonometric identities and equations, polar coordinates and applications. Prereq: MATH 103 or placement. Credit awarded only for MATH 105 or MATH 107, not both.

MATH 107. Precalculus. 4 Credits.
Equations and inequalities; polynomial, rational, exponential, logarithmic and trigonometric functions; inverse trigonometric functions; algebraic and trigonometric methods commonly needed in calculus. An expedited, combined offering of MATH 103 and MATH 105. Prereq: Placement into Math 103 and completion of the College Algebra module in eight weeks. Credit awarded only for MATH 105 or MATH 107, not both.

MATH 128. Introduction to Linear Algebra. 1 Credit.
Systems of linear equations, row operations, echelon form, matrix operations, inverses, and determinants. Prereq: MATH 105 or MATH 107. Credit awarded only for MATH 128 or MATH 129, not both.

MATH 129. Basic Linear Algebra. 3 Credits.
Systems of linear equations, matrices, determinants, vector spaces, lines and planes in space, linear transformations, eigenvalues and eigenvectors. Credit awarded only for MATH 128 or MATH 129, not both. Prereq: MATH 105 or MATH 107.

MATH 144. Mathematics for Business. 4 Credits.
Mathematics of finance, linear programming and its applications in business, limits, continuity, derivatives, implicit and logarithmic differentiation, higher order derivatives, optimization and extrema, partial differentiation, extreme values of functions of two variables. Prereq: MATH 103, MATH 107 or placement survey. Credit awarded only for MATH 144 or MATH 146, not both.

MATH 146. Applied Calculus I. 4 Credits.
Limits, derivatives, integrals, exponential and logarithmic functions and applications. Prereq: MATH 103, MATH 107, or placement. Credit awarded only for MATH 144 or MATH 146, not both.

MATH 147. Applied Calculus II. 4 Credits.
Definite integrals, trigonometry, introduction to differential equations, infinite sequences and series, probability and applications. Prereq: MATH 146.

MATH 165. Calculus I. 4 Credits.
Limits, continuity, differentiation, Mean Value Theorem, integration, Fundamental Theorem of Calculus and applications. Prereq: MATH 105 or MATH 107 or placement.

MATH 166. Calculus II. 4 Credits.
Applications and techniques of integration; polar equations; parametric equation; sequences and series, power series. Prereq: MATH 165.

MATH 194. Individual Study. 1-5 Credits.

MATH 196. Field Experience. 1-15 Credits.

MATH 199. Special Topics. 1-5 Credits.

MATH 259. Multivariate Calculus. 3 Credits.
Functions of several variables, vectors in two and three variables, partial derivatives, surfaces and gradients, tangent planes, differentials, chain rule, optimization, space curves, and multiple integrals. Prereq: MATH 166. Credit awarded only for MATH 259 or MATH 265, not both.

MATH 265. Calculus III. 4 Credits.
Multivariate and vector calculus including partial derivatives, multiple integration, applications, line and surface integrals, Green's Theorem, Stoke's Theorem, and Divergence Theorem. Prereq: MATH 166. Credit awarded only for MATH 259 or MATH 265, not both.

MATH 266. Introduction to Differential Equations. 3 Credits.
Solution of elementary differential equations by elementary techniques. Laplace transforms, systems of equations, matrix methods, numerical techniques, and applications. Prereq: MATH 259 or MATH 265. Coreq: MATH 128, MATH 129, or MATH 329.

MATH 270. Introduction to Abstract Mathematics. 3 Credits.
Sets, symbolic logic, propositions, quantifiers, methods of proof, relations and functions, equivalence relations, math induction and its equivalents, infinite sets, cardinal numbers, number systems. Prereq: MATH 166.

MATH 291. Seminar. 1-3 Credits.

MATH 294. Individual Study. 1-5 Credits.

MATH 299. Special Topics. 1-5 Credits.

MATH 329. Intermediate Linear Algebra. 3 Credits.
Vector spaces over real and complex numbers, matrices, determinants, linear transformations, eigenvalues and eigenvectors, Cayley-Hamilton Theorem, inner product spaces, selected topics and applications. Prereq: MATH 129 and MATH 165.

MATH 346. Metric Space Topology. 3 Credits.
Various metrics on Euclidean spaces, metric spaces, open and closed sets, limit points and convergence, Bolzano Weierstrass Theorem, (uniformly) continuous functions, connected spaces, compact spaces and the Heine Borel Theorem, sequence of functions. Prereq: MATH 270.

MATH 374. Special Problems In Mathematics. 1 Credit.
Diverse and challenging mathematical problems are considered with the intent of honing students' problem solving and proof writing skills. Pass/Fail only. Prereq: MATH 270.

MATH 376. Actuarial Exam Study. 1 Credit.
Selected material from calculus, linear algebra, numerical analysis, and other areas that appear on national actuarial exams. May be repeated for credit. Pass/Fail only. Prereq: MATH 266 and MATH 429.

MATH 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

MATH 391. Seminar. 1-3 Credits.

MATH 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MATH 394. Individual Study. 1-5 Credits.

MATH 399. Special Topics. 1-5 Credits.

MATH 420. Abstract Algebra I. 3 Credits.
Groups, permutations, quotient groups, homomorphisms, rings, ideals, integers. Prereq: MATH 270 and MATH 329. {Also offered for graduate credit - see MATH 620.}.

MATH 421. Abstract Algebra II. 3 Credits.
Division rings, integral domains, fields, field extensions, Galois Theory. Prereq: MATH 420. {Also offered for graduate credit - see MATH 621.}.

MATH 429. Topics in Linear Algebra. 3 Credits.
Advanced topics in linear algebra with a focus on understanding the theoretical foundation of the subject and its uses in advanced mathematics. Topics may vary. Prereq: MATH 270 and MATH 329. {Also offered for graduate credit - see MATH 629.}.

MATH 430. Graph Theory. 3 Credits.
Graphs and directed graphs, graph models, subgraphs, isomorphisms, paths, connectivity, trees, networks, cycles, circuits, planarity, Euler's formula, matchings, bipartite graphs, colorings, and selected advanced topics. Prereq: MATH 270. {Also offered for graduate credit - see MATH 630.}.

MATH 436. Combinatorics. 3 Credits.
Recurrence relations, formal power series, generating functions, exponential generating functions, enumeration, binomial coefficients and identities, hypergeometric functions, Ramsey theory, Sterling and Eulerian numbers. Prereq: MATH 270. {Also offered for graduate credit - see MATH 636.}.

MATH 439. Topics in Algebra and Discrete Mathematics. 3 Credits.
Advanced topics in algebra and discrete mathematics. Topics may vary but may include: algebraic geometry, factorization, partially ordered sets, and/or coding theory. Prereq: MATH 420 or MATH 430 or MATH 436. {Also offered for graduate credit - See MATH 639}.

MATH 440. Axiomatic Geometry. 3 Credits.
Hilbert's axioms for Euclidean geometry, projective geometry, history of parallel axiom, hyperbolic geometry, elliptic geometry. Prereq: MATH 270. {Also offered for graduate credit - see MATH 640.}.

MATH 442. Introduction to Topology. 3 Credits.
Basic Point-Set Topology: Topological Spaces, Open/Closed Sets, Continuity, Connectedness, Compactness; Surfaces: Classification, Basic Invariants; Introduction to Homology; Applications: Brouwer's Fix-Point Theorem, Ham and Sandwich Theorem. Prereq: MATH 346. {Also offered for graduate credit - see MATH 642.}.

MATH 443. Differential Geometry. 3 Credits.
Local and global geometry of plane curves, local geometry of hypersurfaces, global geometry of hypersurfaces, geometry of lengths and distances. Prereq: MATH 265 and MATH 346. {Also offered for graduate credit - see MATH 643.}.

MATH 449. Topics in Topology and Geometry. 3 Credits.
Topics will vary and may include: Riemannian Geometry, Symplectic Topology, Dynamical Systems on Manifolds, Hamiltonian Systems, Geometric Group Theory, Descriptive Set Theory. Prereq: MATH 442 or MATH 443. {Also offered for graduate credit - See MATH 649}.

MATH 450. Real Analysis I. 3 Credits.
Differentiation and Riemann integration in the real numbers. Sequences and series of functions; uniform convergence and power series. Prereq: MATH 346. {Also offered for graduate credit - see.MATH 650.}.

MATH 452. Complex Analysis. 3 Credits.
Complex number systems, analytic and harmonic functions, elementary conformal mapping, integral theorems, power series, Laurent series, residue theorem, and contour integral. Prereq: MATH 265 and MATH 270. {Also offered for graduate credit - see MATH 652.}.

MATH 453. Introduction to Lebesgue Measure. 3 Credits.
Definition of Lebesgue measure. Measurable and Lebesgue integrable functions. Introduction to Lp spaces. Prereq: MATH 450. {Also offered for graduate credit - see MATH 653}.

MATH 454. Introduction to Functional Analysis. 3 Credits.
Functional analysis in sequence spaces. Standard sequence spaces and dual spaces. Hahn-Banach Theorem. Operators on sequences spaces. Prereq: MATH 346. {Also offered for graduate credit - See MATH 654}.

MATH 459. Topics in Analysis. 3 Credits.
Topics will vary and may include: Harmonic Analysis, Dynamical Systems, Fractals, Distribution Theory, and Approximation Theory. Prereq: MATH 450. {Also offered for graduate credit - See MATH 659.}.

MATH 460. Mathematical Software. 1 Credit.
An overview of a mathematical software system, with a focus on its utility in mathematical problems. Possible software systems may include: Mathematica, SAGE, or similar programs. May be repeated for credit with a different software. Prereq: MATH 259 or MATH 265. {Also offered for graduate credit - see MATH 660.}.

MATH 472. Number Theory. 3 Credits.
Properties of integers, number theoretic functions, quadratic residues, continued fractions, prime numbers and their distribution, primitive roots. Prereq: MATH 270. {Also offered for graduate credit - see MATH 672.}.

MATH 473. Cryptology. 3 Credits.
Cryptography and cryptanalysis of ciphers. Discrete logarithms, Diffie-Hellman key exchange, the RSA cryptosystem, elliptic curve cryptography, and selected topics. Prereq: MATH 270 and MATH 329. {Also offered for graduate credit - see MATH 673.}.

MATH 476. Actuary Exam Study. 1 Credit.
Selected material from probability and mathematical statistics in preparation for the national actuarial exam. Prereq: STAT 368 or STAT 468. Cross-listed with STAT.

MATH 478. History of Mathematics. 3 Credits.
Historical considerations emphasizing the source of mathematical ideas, growth of mathematical knowledge, and contributions of some outstanding mathematicians. Prereq: MATH 270. {Also offered for graduate credit - see MATH 678.}.

MATH 480. Applied Differential Equations. 3 Credits.
Method of power series and method of Frobenius, oscillation theorems, special functions (Bessel functions and Legendre functions), linear systems including the exponential matrix. Sturm-Liouville and phase plane analysis as time permits. Prereq: MATH 266. {Also offered for graduate credit - see MATH 680.}.

MATH 481. Fourier Analysis. 3 Credits.
Discrete and continuous Fourier transforms, Fourier series, convergence and inversion theorems, mean square approximation and completeness, Poisson summation, Fast-Fourier transform. Prereq: MATH 265. {Also offered for graduate credit - see MATH 681.}.

MATH 483. Partial Differential Equations. 3 Credits.
First and second order partial differential equations, classification, examples, solution methods for the wave, diffusion, and Laplace equations, causality and energy, boundary value problems, separation of variables, Green's identities, Green's functions. Prereq: MATH 266 and either MATH 270 or Math 329. {Also offered for graduate credit - see MATH 683.}.

MATH 484. Mathematical Methodsof Biological Processes. 3 Credits.
This course provides an introduction to mathematical methods in biology. Prereq: MATH 266. {Also offered for graduate credit - see MATH 684.}.

MATH 485. Topics in Applied Mathematics. 3 Credits.
Topics will vary and may include: Models in Biology and Finance, Network Theory, Calculus of Variation, Stochastic Calculus, Integral Transforms, Control Theory, and Parameter Estimation. Prereq: MATH 483. {Also offered for graduate credit - See MATH 685.}.

MATH 488. Numerical Analysis. 3 Credits.
Numerical solution of nonlinear equations, interpolation, numerical integration and differentiation, numerical solution of initial value problems for ordinary differential equations. Prereq: MATH 266. {Also offered for graduate credit - see MATH 688.}.

MATH 491. Seminar. 1-5 Credits.

MATH 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MATH 493. Undergraduate Research. 1-5 Credits.

MATH 494. Individual Study. 1-5 Credits.

MATH 496. Field Experience. 1-15 Credits.

MATH 499. Special Topics. 1-5 Credits.

MATH 620. Abstract Algebra I. 3 Credits.
Groups, permutations, quotient groups, homomorphisms, rings, ideals, integers. {Also offered for undergraduate credit - see MATH 420.}.

MATH 621. Abstract Algebra II. 3 Credits.
Division rings, integral domains, fields, field extensions, Galois Theory. Prereq: MATH 620. {Also offered for undergraduate credit - see MATH 421.}.

MATH 629. Topics in Linear Algebra. 3 Credits.
Advanced topics in linear algebra with a focus on understanding the theoretical foundation of the subject and its uses in advanced mathematics. Topics may vary. {Also offered for undergraduate credit - see MATH 429.}.

MATH 630. Graph Theory. 3 Credits.
Graphs and directed graphs, graph models, subgraphs, isomorphisms, paths, connectivity, trees, networks, cycles, circuits, planarity, Euler's formula, matchings, bipartite graphs, colorings, and selected advanced topics. {Also offered for undergraduate credit - see MATH 430.}.

MATH 636. Combinatorics. 3 Credits.
Recurrence relations, formal power series, generating functions, exponential generating functions, enumeration, binomial coefficients and identities, hypergeometric functions, Ramsey theory, Sterling and Eulerian numbers. {Also offered for undergraduate credit - see MATH 436.}.

MATH 639. Topics in Algebra and Discrete Mathematics. 3 Credits.
Advanced topics in algebra and discrete mathematics. Topics may vary but may include: algebraic geometry, factorization, partially ordered sets, and/or coding theory. {Also offered for undergraduate credit. See MATH 439.}.

MATH 640. Axiomatic Geometry. 3 Credits.
Hilbert's axioms for Euclidean geometry, projective geometry, history of parallel axiom, hyperbolic geometry, elliptic geometry. {Also offered for undergraduate credit - see MATH 440.}.

MATH 642. Introduction to Topology. 3 Credits.
Basic Point-Set Topology: Topological Spaces, Open/Closed Sets, Continuity, Connectedness, Compactness; Surfaces: Classification, Basic Invariants; Introduction to Homology; Applications: Brouwer's Fix-Point Theorem, Ham and Sandwich Theorem. {Also offered for undergraduate credit - see MATH 442.}.

MATH 643. Differential Geometry. 3 Credits.
Local and global geometry of plane curves, local geometry of hypersurfaces, global geometry of hypersurfaces, geometry of lengths and distances. {Also offered for undergraduate credit - see MATH 443.}.

MATH 649. Topics in Topology and Geometry. 3 Credits.
Topics will vary and may include: Riemannian Geometry, Symplectic Topology, Dynamical Systems on Manifolds, Hamiltonian Systems, Geometric Group Theory, Descriptive Set Theory. {Also offered for undergraduate credit - See MATH 449}.

MATH 650. Real Analysis I. 3 Credits.
Differentiation and Riemann integration in the real numbers. Sequences and series of functions; uniform convergence and power series. {Also offered for undergraduate credit - see MATH 450.}.

MATH 652. Complex Analysis. 3 Credits.
Complex number systems, analytic and harmonic functions, elementary conformal mapping, integral theorems, power series, Laurent series, residue theorem, and contour integral. {Also offered for undergraduate credit - see MATH 452.}.

MATH 653. Introduction to Lebesgue Measure. 3 Credits.
Definition of Lebesgue measure. Measurable and Lebesgue integrable functions. Introduction to Lp spaces. {Also offered for undergraduate credit - see MATH 453}.

MATH 654. Introduction to Functional Analysis. 3 Credits.
Functional analysis in sequence spaces. Standard sequence spaces and dual spaces. Hahn-Banach Theorem. Operators on sequences spaces. {Also offered for undergraduate credit - See MATH 454}.

MATH 659. Topics in Analysis. 3 Credits.
Topics will vary and may include: Harmonic Analysis, Dynamical Systems, Fractals, Distribution Theory, and Approximation Theory. {Also offered for undergraduate credit - See MATH 459.}.

MATH 660. Mathematical Software. 1 Credit.
An overview of a mathematical software system, with a focus on its utility in mathematical problems. Possible software systems may include: Mathematica, SAGE, or similar programs. May be repeated for credit with a different software. {Also offered for undergraduate credit - see MATH 460.}.

MATH 672. Number Theory. 3 Credits.
Properties of integers, number theoretic functions, quadratic residues, continued fractions, prime numbers and their distribution, primitive roots. {Also offered for undergraduate credit - see MATH 472.}.

MATH 673. Cryptology. 3 Credits.
Cryptography and cryptanalysis of ciphers. Discrete logarithms, Diffie-Hellman key exchange, the RSA cryptosystem, elliptic curve cryptography, and selected topics. {Also offered for undergraduate credit - see MATH 473.}.

MATH 678. History of Mathematics. 3 Credits.
Historical considerations emphasizing the source of mathematical ideas, growth of mathematical knowledge, and contributions of some outstanding mathematicians. {Also offered for undergraduate credit - see MATH 478.}.

MATH 680. Applied Differential Equations. 3 Credits.
Method of power series and method of Frobenius, oscillation theorems, special functions (Bessel functions and Legendre functions), linear systems including the exponential matrix. Sturm-Liouville and phase plane analysis as time permits. {Also offered for undergraduate credit - see MATH 480.}.

MATH 681. Fourier Analysis. 3 Credits.
Discrete and continuous Fourier transforms, Fourier series, convergence and inversion theorems, mean square approximation and completeness, Poisson summation, Fast-Fourier transform. {Also offered for undergraduate credit - see MATH 481.}.

MATH 683. Partial Differential Equations. 3 Credits.
First and second order partial differential equations, classification, examples, solution methods for the wave, diffusion, and Laplace equations, causality and energy, boundary value problems, separation of variables, Green's identities, Green's functions. {Also offered for undergraduate credit - see MATH 483.}.

MATH 684. Mathematical Methods of Biological Processes. 3 Credits.
This course provides an introduction to mathematical methods in biology. {Also offered for undergraduate credit - see MATH 484.}.

MATH 685. Topics in Applied Mathematics. 3 Credits.
Topics will vary and may include: Models in Biology and Finance, Network Theory, Calculus of Variation, Stochastic Calculus, Integral Transforms, Control Theory, and Parameter Estimation. {Also offered for undergraduate credit - See MATH 485.}.

MATH 688. Numerical Analysis. 3 Credits.
Numerical solution of nonlinear equations, interpolation, numerical integration and differentiation, numerical solution of initial value problems for ordinary differential equations. {Also offered for undergraduate credit - see MATH 488.}.

MATH 690. Graduate Seminar. 1-3 Credits.

MATH 696. Special Topics. 1-5 Credits.

MATH 720. Algebra I. 3 Credits.
Graduate level survey of algebra: rings, modules, linear algebra and selected advanced topics. Prereq: MATH 621.

MATH 721. Algebra II. 3 Credits.
Graduate level survey of algebra: groups, fields, Galois theory, and selected advanced topics. Prereq: MATH 720.

MATH 726. Homological Algebra. 3 Credits.
An overview of the techniques of homological algebra. Topics covered will include categories and functors, exact sequences, (co)chain complexes, Mayer-Vietoris sequences, TOR and EXT. Applications to other fields will be stressed. Prereq: MATH 720.

MATH 732. Introduction to Bioinformatics. 3 Credits.
An introduction to the principles of bioinformatics including information relating to the determination of DNA sequencing. Prereq: STAT 661. Cross-listed with CSCI 732 and STAT 732.

MATH 736. Enumerative Combinatorics. 3 Credits.
Combinatorial enumeration, generating functions, inversion formulae, formal power series, and selected advanced topics. Prereq: MATH 636.

MATH 737. Algebraic Combinatorics. 3 Credits.
Posets, distributive lattices, tableaux dynamics, symmetric functions, representation theory, and selected advanced topics. Prereq: MATH 636.

MATH 746. Topology I. 3 Credits.
Topological spaces, convergence and continuity, separation axioms, compactness, connectedness, metrizability, fundamental group and homotopy theory. Advanced topics may include homology theory, differential topology, three-manifold theory and knot theory. Prereq: MATH 642.

MATH 747. Topology II. 3 Credits.
Topological spaces, convergence and continuity, separation axioms, compactness, connectedness, metrizability, fundamental group and homotopy theory. Advanced topics may include homology theory, differential topology, three-manifold theory and knot theory. Prereq: MATH 642.

MATH 750. Analysis. 3 Credits.
Lebesgue and general measure and integration theory, differentiation, product spaces, metric spaces, elements of classical Banach spaces, Hilbert spaces, and selected advanced topics. Prereq: MATH 650.

MATH 752. Complex Analysis. 3 Credits.
Analytic and harmonic functions, power series, conformal mapping, contour integration and the calculus of residues, analytic continuation, meromorphic and entire functions, and selected topics. Prereq: MATH 652.

MATH 754. Functional Analysis. 3 Credits.
Normed spaces, linear maps, Hahn-Banach Theorem and other fundamental theorems, conjugate spaces and weak topology, adjoint operators, Hilbert spaces, spectral theory, and selected topics. Prereq: MATH 750.

MATH 756. Harmonic Analysis. 3 Credits.
A survey of Harmonic analysis including: Lp spaces; Fourier Series; Fourier transform; Hilbert transform; and special selected topics. Prereq: MATH 750.

MATH 760. Ordinary Differential Equations I. 3 Credits.
Existence, uniqueness, and extensibility of solutions to initial value problems, linear systems, stability, oscillation, boundary value problems, and selected advanced topics. Prereq: MATH 650 or MATH 680.

MATH 782. Mathematical Methods in Physics I. 3 Credits.
Review of practical mathematical methods routinely used by physicists, including applications. Focus on differential equations, variational principles, and other selected topics. Cross-listed with PHYS 752.

MATH 783. Mathematical Methods in Physics II. 3 Credits.
Tensor analysis, matrices and group theory, special relativity, integral equations and transforms, and selected advanced topics. Prereq: MATH 629 and MATH 652. Cross-listed with PHYS 753.

MATH 784. Partial Differential Equations I. 3 Credits.
Classification in elliptic, parabolic, hyperbolic type; existence and uniqueness for second order equations; Green's functions, and integral representations; characteristics, nonlinear phenomena. Prereq: MATH 650 or MATH 683.

MATH 790. Graduate Seminar. 1-3 Credits.

MATH 791. Temporary/Trial Topics. 1-5 Credits.

MATH 793. Individual Study/Tutorial. 1-5 Credits.

MATH 794. Practicum/Internship. 1-8 Credits.

MATH 796. Special Topics. 1-5 Credits.

MATH 797. Master's Paper. 1-3 Credits.

MATH 798. Master's Thesis. 1-10 Credits.

MATH 810. Research in the Teaching of University Mathematics. 3 Credits.
This course will cover fundamental topics in mathematics education research including: research design, fundamental research areas, and the interconnection between research and classroom practices.

MATH 824. Topics in Commutative Algebra. 3 Credits.
Topics vary each time the course is offered and may include: dimension theory, integral dependence, factorization, regular rings, Cohen-Macaulay rings, Gorenstein rings. May be repeated for credit with change in subtopic. Prereq: MATH 720.

MATH 825. Theory Of Rings. 3 Credits.
The ideal theory of commutative rings, structure of (non-commutative) rings, and selected advanced topics. Prereq: MATH 720.

MATH 830. Graph Theory. 3 Credits.
Graduate-level survey of graph theory: paths, connectivity, trees, cycles, planarity, genus, Eulerian graphs, Hamiltonian graphs, factorizations, tournaments, embedding, isomorphism, subgraphs, colorings, Ramsey theory, girth. Prereq: MATH 630.

MATH 839. Topics in Combinatorics and Discrete Mathematics. 3 Credits.
Selected topics in combinatorics and discrete mathematics. Topics vary each time the course is offered and may include: symmetric functions, Coxeter theory, geometric combinatorics of polytopes, computational combinatorics, statistical mechanics and combinatorics, or dynamical algebraic combinatorics.

MATH 849. Topics in Geometry & Topology. 3 Credits.
Advanced topics in Geometry and/or Topology. Topics vary but may include: differential geometry, K-theory, knot theory, or noncommutative geometry. May be repeated for credit with change in subtopic. Prereq: MATH 642, MATH 643.

MATH 856. Dynamical Systems. 3 Credits.
A study of basic notions of topological and symbolic dynamics. Introduction to measurable dynamics and ergodic theory. Ergodicity, mixing and entropy of dynamical systems. Prereq: MATH 750.

MATH 857. Topics in Functional Analysis. 3 Credits.
Maximal monotone operators and the Hille-Yosida theorem, Sobolev spaces in dimension one and applications, Sobolev spaces in higher dimensions, extension operators, Sobolev embedding theorems, Poincare inequality, duality. May be repeated for credit with change in subtopic. Prereq: MATH 750. Co-req: MATH 751.

MATH 861. Ordinary Differential Equations II. 3 Credits.
Existence, uniqueness, and extendibility of solutions to initial value problems, linear systems, stability, oscillation, boundary value problems, difference equations, and selected advanced topics. Prereq: MATH 760.

MATH 862. Integral Equations. 3 Credits.
Existence and uniqueness of solutions of Fredholm and Volterra integral equations, Fredholm Theory, singular integral equations, and selected advanced topics. Prereq: MATH 650.

MATH 864. Calculus Of Variations. 3 Credits.
Variational techniques of optimization of functionals, conditions of Euler, Weierstrass, Legendre, Jacobi, Erdmann, Pontryagin Maximal Principle, applications, and selected advanced topics. Prereq: MATH 650.

MATH 867. Topics in Applied Mathematics. 3 Credits.
Topics will vary and may include: Optimal Control, Robust Control, Stability Analysis, Mathematics of Networks, Models in Biology, Levy Processes, Asymptotic Expansions. May be repeated for credit with change in subtopic. Prereq: MATH 650 or MATH 680.

MATH 878. Modern Probability Theory. 3 Credits.
Probability theory presented from the measure theoretic perspective. Emphasis on various types of convergence and limit theorems. Discussion of random walks, conditional expectations, and martingales. Prereq: STAT 768 or MATH 750. Cross-listed with STAT 778.

MATH 880. Methods of Optimization. 3 Credits.
Elements of convex analysis, constrained and unconstrained multi-dimensional linear and nonlinear optimization theory and algorithms, convergence properties and computational complexity. Prereq: CSCI 653. Cross-listed with CSCI 880.

MATH 881. Mathematical Control Theory. 3 Credits.
Standard optimal control and optimal estimation problems; duality; optimization in Hardy space; robust control design. Prereq: MATH 650.

MATH 885. Partial Differential Equations II. 3 Credits.
Nonlinear partial differential equations, Non-variational techniques, Hamilton-Jacobi equations, Riemann invariants, Entropy/entropy-flux pairs, selected advanced topics. Prereq: MATH 784.

MATH 888. Numerical Analysis. 3 Credits.
Numerical solutions to partial differential and integral equations, error analysis, stability, acceleration of convergence, numerical approximation, and selected advanced topics. Prereq: MATH 688.

MATH 893. Individual Study/Tutorial. 1-5 Credits.

MATH 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

MATH 899. Doctoral Dissertation. 1-15 Credits.

Mechanical Engineering (ME)

ME 111. Introduction to Mechanical Engineering. 2 Credits.
This course introduces students to the field of mechanical engineering, the Mechanical Engineering degree program at NDSU, and potential career opportunities in the discipline through the use of hands-on, project-based learning experiences in multi-member teams addressing traditional and newly emerging topics in the field of mechanical engineering, including computer aided design, solid mechanics, fluid dynamics, thermodynamics, materials selection, instrumentation and data analysis in the context of problem-solving and design. Prereq: Acceptance into the Pre-Mechanical Engineering major.

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.

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 166. Coreq: MATH 129.

ME 221. Engineering Mechanics I. 3 Credits.
Scaler and vector approaches to trusses, frames and machines, internal forces, friction forces, center of gravity, centroid, and moment inertia. Prereq: MATH 165.

ME 222. Engineering Mechanics II. 3 Credits.
Dynamics of particles and rigid bodies, work energy, impulse-momentum, principles of conservation of energy and momentum. Prereq: ME 221, MATH 166.

ME 223. Mechanics of Materials. 3 Credits.
Introduction to stress, strain, and their relationships; torsion of circular shafts, bending stresses, deflection of beams, stress transformations. Prereq: ME 221.

ME 291. Seminar. 1-3 Credits.

ME 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ME 294. Individual Study. 1-5 Credits.

ME 299. Special Topics. 1-5 Credits.

ME 311. Introduction To Aviation. 3 Credits.
General introduction to aviation and preparation for FAA examination for Private Pilot License, study of FAA regulations, weather conditions, visual and radio navigation. F, S.

ME 312. Introduction to Flight. 2 Credits.
Instruction in flight procedures, operation of aircraft, and introduction to solo flight. Completion of 15 hours of dual flight instruction required. Coreq: ME 311. F, S.

ME 313. Commercial Instrument Ground School. 3 Credits.
Preparation of student for FAA written examination for Commercial Certificate and Instrument Rating License; study of commercial flight maneuvers and instrument flying and procedures. Prereq: ME 311 or holder of private pilot license. On demand.

ME 331. Materials Science and Engineering. 4 Credits.
Characterization of microscopic structures and associated macroscopic properties and performance of mechanical engineering design materials (metals, ceramics, plastics) and processing effects. Includes laboratory. Includes laboratory. Prereq: CHEM 122, ME 223 and admission to the Mechanical Engineering major.

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 the Mechanical Engineering major.

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, and availability. Prereq: ME 221.

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 the Mechanical Engineering major.

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 the Mechanical Engineering major.

ME 361. Product Design and Development. 3 Credits.
This course provides an insight into the mechanical design process with the focus on developing a new product with thoughtful implementation of human-centered design (robust design, design for environment, human factors, etc.). Topics on project planning and scheduling and conceptual design process will be covered. In addition, this course provides students with an introduction into the business aspects of project management and product development. Requires admission to the Mechanical Engineering major.

ME 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ME 391. Seminar. 1-3 Credits.

ME 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ME 394. Individual Study. 1-5 Credits.

ME 397. Fe/Coop Ed/Internship. 1-4 Credits.

ME 399. Special Topics. 1-5 Credits.

ME 412. Engineering Measurements. 3 Credits.
Principles and characteristics of instruments used for engineering measurements, statistical analysis of data, signal conditioning, data acquisition systems. Includes laboratory. Prereq: ECE 306, ME 213 and admission to the Mechanical Engineering major. {Also offered for graduate credit - see ME 612.}.

ME 421. Theory of Vibrations. 3 Credits.
Fundamentals of vibrations; free, forced, and damped vibration of single and multiple degrees of freedom systems. Prereq: ME 213, MATH 266 and admission to the Mechanical Engineering major. {Also offered for graduate credit - see ME 621.}.

ME 435. Plastics and Polymer Processing in Manufacturing. 3 Credits.
Product and process engineering for manufacturers of plastic products; material evaluation and selection, mold design, process design, quality evaluation of manufactured plastic parts. Prereq: MATH 266. {Also offered for graduate credit - see ME 635.}.

ME 436. Biopolymers and Biocomposites. 3 Credits.
Structure/properties/synthesis of biopolymers, biomaterials and engineered biocomposites derived from plant based materials. An interdisciplinary course designed for undergraduate students. Introduction to science and engineering of converting biorenewable resources into novel biobased materials and products. Introduction to principles and concepts critical to successful design of polymeric biomaterials, coatings, and biocomposites. Understanding environmental impacts through life cycle analysis (LCA). Prereq: CHEM 122 and at least junior standing. Cross-listed with CHEM 436 and CPM 436. {Also offered for graduate credit - See ME 636.}.

ME 437. Engineering Ceramics. 3 Credits.
Study the crystal and defect structures to determine the electrical and mass transport behaviors in ceramic materials. Investigation on microstructure of ceramic materials and its effect on optical, magnetic, dielectic, and thermo-mechanical properties. Prereq: ME 223, ME 331 and admission to the Mechanical Engineering major.

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 Mechanical Engineering major. 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 Mechanical Engineering major. {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 the Mechanical Engineering major. {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 the Mechanical Engineering major. 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. Requires admission to Mechanical Engineering major.

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 the Mechanical Engineering major.

ME 466. Basic Principles of Unmanned Vehicles. 3 Credits.
This course equips students with basic knowledge of the principles of unmanned ground, air, and underwater vehicles. Students learn engineering principles involved in developing unmanned vehicles, which include locomotion systems, path planning, control, and navigation systems. Prereq: ME 213 or ECE 173 and ECE 301 or ECE 331. Prereq or Coreq: Admission to a ME Program and at least junior standing. Dual-listing: ME 666.

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 Mechanical Engineering major. {Also offered for graduate credit - see ME 668.}.

ME 469. Energy Storage Technology. 3 Credits.
This course will cover the fundamentals of energy storage. It will provide an introduction to the principles of thermal, mechanical, and electrochemical storage technologies. Prereq: ME 350 or ME 351 and MATH 266. Prereq or Coreq: Mechanical Engineering major only. Dual-listing: ME 669.

ME 470. Renewable Energy Technology. 3 Credits.
Introduction to renewable energy technology, solar thermal energy systems, solar photovoltaic systems, wind turbines; biomass; bio-fuels; urban waste to energy from pyrolysis plants; hydrogen energy and fuel cells. Prereq: ME 350 or ME 351 and admission to the Mechanical Engineering major. {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 Mechanical Engineering major. {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 Mechanical Engineering major. {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 the Mechanical Engineering major. {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 the Mechanical Engineering major. {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 the Mechanical Engineering major. {Also offered for graduate credit - see ME 675.}.

ME 476. Mechatronics. 3 Credits.
Design and development of mechatronic systems that require an integrated knowledge of mechanical engineering, electronics, computer science and control theory. Prereq: ECE 301 or ECE 311 and admission to the Mechanical Engineering major. {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 the Mechanical Engineering major. {Also offered for graduate credit - see ME 677.}.

ME 478. Advanced Flow Diagnostics. 3 Credits.
Introduction and review of fundamentals of advanced thermal and fluid measurement techniques for engineering applications including advanced laser and optical diagnostics, high speed imaging, infrared thermography, fiber optics, fluorescence, etc. Prereq: ME 352 and admission to the Mechanical Engineering major. {Also offered for graduate credit - See ME 678}.

ME 479. Fluid Power Systems Design. 3 Credits.
Fluid dynamics principles and fluid properties are applied to the study of function, performance, and design of system components and systems for power transmission and control purposes. Prereq: ABEN 263 or CE 309 or ME 352. 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 the Mechanical Engineering major. {Also offered for graduate credit - see ME 680.}.

ME 481. Fundamentals of Energy Conversion. 3 Credits.
Foundations of the engineering of energy conversion. Introduction to electrical power generating systems and their major components. Concepts and designs in thermodynamic cycles for engineering applications. Prereq: ME 350 or ME 351. Prereq or Coreq: Mechanical Engineering major. Dual-listing: ME 681.

ME 482. Fuel Cell Science and Engineering. 3 Credits.
Fundamental concepts and technology of state-of-the-art fuel cells and their applications. Prereq: CHEM 121, ME 350 or ME 351 and admission to the 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 the Mechanical Engineering major. {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 the Mechanical Engineering major. {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 the Mechanical Engineering major. {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 or Coreq: Senior standing in Engineering or Sciences. Cross-listed with CE 486. Dual-listing: 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 the Mechanical Engineering major. {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 the Mechanical Engineering major. {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 the Mechanical Engineering major. {Also offered for graduate credit - see ME 689.}.

ME 491. Seminar. 1-5 Credits.

ME 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ME 494. Individual Study. 1-5 Credits.

ME 496. Field Experience. 1-15 Credits.

ME 499. Special Topics. 1-5 Credits.

ME 612. Engineering Measurements. 3 Credits.
Principles and characteristics of instruments used for engineering measurements, statistical analysis of data, signal conditioning, data acquisition systems. Includes laboratory. {Also offered for undergraduate credit - see ME 412.}.

ME 621. Theory of VIbrations. 3 Credits.
Fundamentals of vibrations; free, forced, and damped vibration of single and multiple degrees of freedom systems. {Also offered for undergraduate credit - see ME 421.}.

ME 635. Plastics and Injection Molding Manufacturing. 3 Credits.
Product and process engineering for manufacturers of plastic products; material evaluation and selection, mold design, process design, quality evalutaion of manufactured plastic parts. Cross-listed with IME 635. {Also offered for undergraduate credit - see ME 435.}.

ME 636. Biopolymers and Biocomposites. 3 Credits.
Structure/properties/synthesis of biopolymers, biomaterials and engineered biocomposites derived from plant based materials. An interdisciplinary course designed for graduate students. Introduction to science and engineering of converting biorenewable resources into novel biobased materials and products. Introduction to principles and concepts critical to successful design of polymeric biomaterials, coatings, and biocomposites. Understanding environmental impacts through life cycle analysis (LCA). Restrictions: A junior standing student can register if accepted to an accelerated graduate program. Cross-listed with CHEM 636 and CPM 636. {Also offered for undergraduate credit - See ME 436.}.

ME 637. Engineering Ceramics. 3 Credits.
Study the crystal and defect structures to determine the electrical and mass transport behaviors in ceramic materials. Investigation on microstructure of ceramic materials and its effect on optical, magnetic, dielectic, 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 666. Basic Principles of Unmanned Vehicles. 3 Credits.
This course equips students with basic knowledge of the principles of unmanned ground, air, and underwater vehicles. Students learn engineering principles involved in developing unmanned vehicles, which include locomotion systems, path planning, control, and navigation systems. Dual-listing: ME 466.

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 669. Energy Storage Technology. 3 Credits.
This course will cover the fundamentals of energy storage. It will provide an introduction to the principles of thermal, mechanical, and electrochemical storage technologies. {Also offered for undergraduate credit - see ME 469.}.

ME 670. Renewable Energy Technology. 3 Credits.
Introduction to renewable energy technology, solar thermal energy systems, solar photovoltaic systems, wind turbines; biomass; bio-fuels; urban waste to energy from pyrolysis plants; hydrogen energy and fuel cells. {Also offered for undergraduate credit - see ME 470.}.

ME 671. Experimental Stress Analysis. 3 Credits.
Introduction to experimental techniques for the measurement of stresses and strains, including strain gages, optical methods, photoelasticity, and brittle coatings. {Also offered for undergraduate credit - see ME 471.}.

ME 672. Fatigue and Fracture of Metals. 3 Credits.
Causes and effects of fatigue failure and fracture of metals, analytical methods for fatigue design and fatigue life prediction, fatigue crack initiation and propagation, fatigue testing and validation. {Also offered for undergraduate credit - see ME 472.}.

ME 673. Engineering with Polymeric Materials. 3 Credits.
This course will introduce basic polymer materials including plastics, rubbers, fibers, and adhesives; structures, properties, and their relationships of polymers; additives; processing technologies, applications and development. {Also offered for undergraduate credit - see ME 473.}.

ME 674. Mechanics of Composite Materials. 3 Credits.
Materials, properties, stress, and strength analyses; engineering design and manufacturing aspects of short and continuous fiber-reinforced materials. {Also offered for undergraduate credit - see ME 474.}.

ME 675. Automatic Controls. 3 Credits.
Introduction to industrial automatic controls. Theory and applications of pneumatic control, continuous process control, and programmable logic control. Demonstrations and discussion of the current industrial practice. {Also offered for undergraduate credit - see ME 475.}.

ME 676. Mechatronics. 3 Credits.
Design and development of mechatronic systems that require an integrated knowledge of mechanical engineering, electronics, computer science and control theory. {Also offered for undergraduate credit - see ME 476.}.

ME 677. ME Finite Element Analysis. 3 Credits.
Introduction to the finite element method and its application to problems in mechanical engineering, including stress analysis. {Also offered for undergraduate credit - see ME 477.}.

ME 678. Advanced Flow Diagnostics. 3 Credits.
Introduction and review of fundamentals of advanced thermal and fluid measurement techniques for engineering applications including advanced laser and optical diagnostics, high speed imaging, infrared thermography, fiber optics, fluorescence, etc. {Also offered for undergraduate credit - See ME 478}.

ME 679. Fluid Power Systems Design. 3 Credits.
Fluid dynamics principles and fluid properties are applied to the study of function, performance, and design of system components and systems for power transmission and control purposes. {Also offered for undergraduate credit - see ME 479.}.

ME 680. Biofluid Mechanics. 3 Credits.
Overview of fluid dynamical phenomena in biological systems; flow behavior of fluids in living organisms; application of fluid mechanics to the cardiovascular system and blood circulation. {Also offered for undergraduate credit - see ME 480.}.

ME 681. Fundamentals of Energy Conversion. 3 Credits.
Foundations of the engineering of energy conversion. Introduction to electrical power generating systems and their major components. Concepts and designs in thermodynamic cycles for engineering applications. Dual-listing: ME 481.

ME 682. Fuel Cell Science and Engineering. 3 Credits.
Fundamental concepts and technology of state-of-the-art fuel cells and their applications. {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 affined 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. Viscous Fluid Flow. 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. Prereq or Coreq: Recommended completion of an undergraduate fluid dynamics course (ME 352 equivalent).

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. Advanced Heat Transfer. 3 Credits.
Advanced study of heat conduction and convection. Analytical, graphical, and numerical evaluations of the temperature field. Use of advanced mathematical methods in the solution of boundary value problems. Solutions to laminar and turbulent convective heat transfer problems. Analysis of boiling and condensation Prereq or Coreq: Recommended completion of an undergraduate heat transfer course (ME 454 equivalent).

ME 762. Applied Multimode Heat Transfer. 3 Credits.
The course will expand on the heat transfer concepts covered undergraduate heat transfer courses. The focus is on radiative transfer and applying heat transfer principles to complex, multi-mode heat transfer relevant to current engineering problems.

ME 763. Advanced Transport Phenomena. 3 Credits.
Advanced topics in combined heat, mass and momentum transport, with applications to energy and biomedical systems.

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 892. Graduate Teaching Experience. 1-6 Credits.

ME 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

ME 899. Doctoral Dissertation. 1-15 Credits.

Medical Laboratory Science (MLS)

MLS 194. Individual Study. 1-5 Credits.

MLS 196. Field Experience. 1-15 Credits.

MLS 199. Special Topics. 1-5 Credits.

MLS 200. Introduction to Medical Laboratory Science. 1 Credit.
Introduction to medical laboratory science. Lectures, discussions, and field trips focus on professional traits and communication, ethical behavior of the health care provider, major curriculum requirements, and scope of practice.

MLS 291. Seminar. 1-3 Credits.

MLS 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MLS 294. Individual Study. 1-3 Credits.

MLS 299. Special Topics. 1-5 Credits.

MLS 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

MLS 391. Seminar. 1-3 Credits.

MLS 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MLS 394. Individual Study. 1-3 Credits.

MLS 399. Special Topics. 1-5 Credits.

MLS 435. Hematology. 2 Credits.
An introduction to the origin, matruation, and function of the formed elements of human blood. Identification of normal cells will be emphasized. Prereq: MICR 202L or MICR 350L.

MLS 491. Seminar. 1-5 Credits.

MLS 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MLS 494. Individual Study. 1-5 Credits.

MLS 496. Field Exp/Internship. 1-15 Credits.
Restricted to Medical Laboratory Science majors.

MLS 499. Special Topics. 1-5 Credits.

Microbiology (MICR)

MICR 100. Famine, Plague, and Cheese. Microbes: the cause and solution to the world's problems. 3 Credits.
In alignment with the United Nations Sustainable Development Goals for global prosperity, discover how microbes impact health, agriculture, and the environment, and learn about careers in microbiology, biotechnology, and genetic engineering that are changing the world.

MICR 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

MICR 194. Individual Study. 1-5 Credits.

MICR 196. Field Experience. 1-15 Credits.

MICR 199. Special Topics. 1-5 Credits.

MICR 202. Introductory Microbiology. 2 Credits.
Study of the characteristics and importance of microorganisms with emphasis on their identification, control, and relationships to health and disease. Not for microbiology majors.

MICR 202L. Introductory Microbiology Lab. 1 Credit.
Study of the characteristics and importance of microorganisms with emphasis on their identification, control, and relationships to health and disease. Not for microbiology majors.

MICR 291. Seminar. 1-3 Credits.

MICR 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MICR 294. Individual Study. 1-5 Credits.

MICR 299. Special Topics. 1-5 Credits.

MICR 350. General Microbiology. 3 Credits.
Principles of microbiology for students requiring a rigorous professionally oriented course. This course is a prerequisite to most microbiology courses. Topics, as applied to an overview of microorganisms, include structure, physiology, metabolism, growth, genetics, ecology, pathogenesis, immunology, immunization, and infectious disease treatment/prevention. Prereq: BIOL 151 and CHEM 122.

MICR 350L. General Microbiology Lab. 2 Credits.
Principles of microbiology for students requiring a rigorous professionally-oriented course. Prereq: BIOL 150 and CHEM 122.

MICR 352. Critical Skills in Microbiology. 3 Credits.
Further exploration and application of microbiological concepts introduced in MICR 350 in a manner that develops skills important for successful completion of a microbiology degree and success in careers related to microbiology. Prereq: MICR 350.

MICR 352L. Critical Skills in Microbiology Laboratory Research. 2 Credits.
Application of microbiology skills, techniques, and tools to perform novel research. Prereq: MICR 350L.

MICR 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

MICR 391. Seminar. 1-3 Credits.

MICR 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MICR 394. Individual Study. 1-5 Credits.

MICR 397. Fe/Coop Ed/Internship. 1-4 Credits.

MICR 399. Special Topics. 1-5 Credits.

MICR 445. Animal Cell Culture Techniques. 2 Credits.
Methods of animal cell culture propagation and uses for cell culture systems. {Also offered for graduate credit - see MICR 645.}.

MICR 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. 2 Credits.
Study of the nature, physiology, and interactions of microorganisms in foods. Introduction to foodborne diseases, effects of food processing on the microbiota of foods, principles of food preservation, food spoilage, and foods produced by microorganisms. Dual-listing: MICR 653.

MICR 453L. Food Microbiology Laboratory. 1 Credit.
Study of practical aspects of food microbiology, including fermentation, food conservation, sustainable agricultural practices, and biotechnology applications. Tour food processing facilities, including produce, meat, alcohol, and others and food microbiology research at the USDA. It is recommended that students take MICR 453 at the same time as MICR 453L. Dual-listing: MICR 653L.

MICR 455. Microbial Biotechnology. 3 Credits.
Students will explore how microbes are used to solve problems in industry, environment, agriculture, food production, and medicine. Emphasis will be placed on biotechnological techniques utilizing microbes, careers that employ these techniques, and how these techniques are used to impact global problems. Prereq: MICR 350. {Also offered for graduate credit - see MICR 655.}.

MICR 460. Microbial Pathogenesis. 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. Microbial Pathogenesis 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 475. Virology. 3 Credits.
The biology of viruses with emphasis on virus replication and pathogenesis. Co-req: MICR 470. {Also offered for graduate credit - see MICR 675.}.

MICR 477. Vaccinology. 3 Credits.
Vaccinology introduces the basic biological principles governing vaccinology, emphasizing vaccine development and testing, immunity, manufacture, and clinical aspects in veterinary and human medicine. Prereq: MICR 350. Cross-listed with PH 477. Dual-listing: MICR 677 and PH 677.

MICR 480. Microbial Physiology. 3 Credits.
This class will explore the composition and function of eubacterial and archaebacterial cell structure. Further functional exploration will go into nutrient transport in bacteria, principles of energy-yielding carbohydrate metabolism, bacterial fermentation, respiration, and gene regulations of metabolic pathways. Topics such as biofilms, quorum sensing, and the microbiome will be used to apply physiological concepts. Prereq: MICR 350, MICR 350L. Co-req: BIOC 460. {Also offered for graduate credit - see MICR 680.}.

MICR 481. Microbial Genomics with Computational Laboratory. 3 Credits.
Microbial genome science with additional emphasis on microbial evolution and environmental science. Topics include: i) genomic diversity, ii) the consequences of horizontal gene transfer, iii) single cell and population genomics, and iv) environmental metagenomics. Recommended: STAT 330. Prereq: BIOL/PLSC 315. {Also offered for graduate credit - see MICR 681.}.

MICR 482. Microbial Genetics. 3 Credits.
Microbial genetics will explore gene identification, mutation, DNA repair, gene transfer, recombination, bacteriophage genetics, and gene regulation. Topics such as bacterial antibiotic resistance, genetic testing and manipulation for biotechnological applications will be used to apply genetic concepts. Prereq: MICR 350. Coreq: BIOC 460. {Also offered for graduate credit - see MICR 682.}.

MICR 485. Capstone Experience I: Reflecting and Planning. 1 Credit.
The capstone experience is the reflection of earlier coursework that will allow students to integrate their knowledge. Students will spend time reflecting on their degree progress, plan and prepare for the transition from undergraduate to their next step, and create a prospectus that outlines their capstone experience.

MICR 486. Capstone Experience II: Reflection and Dissemination. 1 Credit.
Students will support each other through peer mentoring activities and reflect on their capstone experience in relation to the outlined goals. The course culminates in the dissemination of the knowledge gained from their experience at a designated event open to the department. Prereq: MICR 485.

MICR 491. Seminar. 1-5 Credits.

MICR 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MICR 493. Undergraduate Research. 1-5 Credits.

MICR 494. Individual Study. 1-5 Credits.

MICR 496. Field Experience. 1-15 Credits.

MICR 497. FE/Coop Ed/Internship. 1-15 Credits.

MICR 499. Special Topics. 1-5 Credits.

MICR 645. Animal Cell Culture Techniques. 2 Credits.
Methods of animal cell culture propagation and uses for cell culture systems. {Also offered for undergraduate credit - see MICR 445.}.

MICR 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. 2 Credits.
Study of the nature, physiology, and interactions of microorganisms in foods. Introduction to foodborne diseases, effects of food processing on the microbiota of foods, principles of food preservation, food spoilage, and foods produced by microorganisms. Dual-listing: MICR 453.

MICR 653L. Food Microbiology Laboratory. 1 Credit.
Study of practical aspects of food microbiology, including fermentation, food conservation, sustainable agricultural practices, and biotechnology applications. Tour food processing facilities, including produce, meat, alcohol, and others and food microbiology research at the USDA. Coreq: MICR 653. Dual-listing: MICR 453L.

MICR 655. Microbial Biotechnology. 3 Credits.
Students will explore how microbes are used to solve problems in industry, environment, agriculture, food production, and medicine. Emphasis will be placed on biotechnological techniques utilizing microbes, careers that employ these techniques, and how these techniques are used to impact global problems. {Also offered for graduate credit - see MICR 655.}.

MICR 660. Microbial Pathogenesis. 3 Credits.
Study of the microorganisms that cause disease and of disease processes. {Also offered for undergraduate credit - see MICR 460.}.

MICR 661. Microbial Pathogenesis 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 675. Virology. 3 Credits.
The biology of viruses with emphasis on virus replication and pathogenesis. {Also offered for undergraduate credit - see MICR 475.}.

MICR 677. Vaccinology. 3 Credits.
Vaccinology introduces the basic biological principles governing vaccinology, emphasizing vaccine development and testing, immunity, manufacture, and clinical aspects in veterinary and human medicine. Cross-listed with PH 677. Dual-listing: MICR 477.

MICR 680. Microbial Physiology. 3 Credits.
This class will explore the composition and function of eubacterial and archaeobacterial cell structure. Further functional exploration will go into nutrient transport in bacteria, principles of energy-yielding carbohydrate metabolism, bacterial fermentation, respiration, and gene regulations of metabolic pathways. Topics such as biofilms, quorum sensing, and the microbiome will be used to apply physiological concepts. {Also offered for undergraduate credit - see MICR 480.}.

MICR 681. Microbial Genomics with Computational Laboratory. 3 Credits.
Microbial genome science with additional emphasis on microbial evolution and environmental science. Topics include: i) genomic diversity, ii) the consequences of horizontal gene transfer, iii) single cell and population genomics, and iv) environmental metagenomics. {Also offered for undergraduate credit - see MICR 481.}.

MICR 682. Microbial Genetics. 3 Credits.
Microbial genetics will explore gene identification, mutation, DNA repair, gene transfer, recombination, bacteriophage genetics, and gene regulation. Topics such as bacterial antibiotic resistance, genetic testing and manipulation for biotechnological applications will be used to apply genetic concepts. {Also offered for undergraduate credit - see MICR 482.}.

MICR 690. Graduate Seminar. 1-3 Credits.

MICR 695. Field Experience. 1-15 Credits.

MICR 696. Special Topics. 1-5 Credits.

MICR 701. Introduction to Graduate Research. 1-3 Credits.
This course is designed to help students transition to their graduate careers in microbiological sciences. Emphasis is placed on planning for success in graduate school, career planning, familiarity with the process of research, rotations with faculty in the department, cohort building, self-efficacy, and mental health.

MICR 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.

MICR 762. Advanced Microbial Pathogenesis. 3 Credits.
Biophysical and biochemical mechanisms by which microorganisms cause infectious disease and host reactions to the disease.

MICR 767. Critical Thinking for the Life Sciences. 3 Credits.
This course is designed to impart critical thinking skills to graduate students in the life sciences. Topics such as information retrieval, problem-solving, Socratic questioning and logical fallacies in sciences will be covered by in-class work shops and application-based assignments.

MICR 770. Immunology of Chronic Infections. 3 Credits.
A study of the host's response to chronic infections, which is illustrated using a framework of diseases of worldwide importance that present different pathologies and outcomes. Prereq: MICR 670.

MICR 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 790. Graduate Seminar. 1-3 Credits.

MICR 791. Temporary/Trial Topics. 1-5 Credits.

MICR 792. Graduate Teaching Experience. 1-6 Credits.

MICR 793. Individual Study/Tutorial. 1-5 Credits.

MICR 794. Practicum/Internship. 1-8 Credits.

MICR 795. Field Experience. 1-15 Credits.

MICR 796. Special Topics. 1-5 Credits.

MICR 797. Master's Paper. 1-3 Credits.

MICR 798. Master's Thesis. 1-10 Credits.

MICR 892. Graduate Teaching Experience. 1-6 Credits.

MICR 893. Individual Study/Tutorial. 1-5 Credits.

MICR 894. Practicum/Internship. 1-8 Credits.

MICR 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

MICR 899. Doctoral Dissertation. 1-15 Credits.

Military Science (MS)

MS 101. Foundations of Officership. 1 Credit.
Introduce fundamental concepts consistent with the military culture; includes leadership, ethics, and Army values. Increase self-confidence through team study and activities involving military skills, leadership reaction course, and making presentations. Weekly lab required. Recommended Coreq: MS 310.

MS 102. Basic Leadership. 1 Credit.
Principles of effective leading; reinforce self-confidence; develop communication skills to improve performance and group interaction; relate organizational ethical values to leadership effectiveness. Weekly lab required. Recommended Coreq: MS 320. S.

MS 110. Army ROTC Physical Fitness. 2 Credits.
Instruction in planning and leading physical fitness programs. Development of physical fitness required of an Army officer. Emphasis on development of an individual fitness program and the role of exercise and fitness in ones life. May be repeated for credit.

MS 194. Individual Study. 1-5 Credits.

MS 196. Field Experience. 1-15 Credits.

MS 199. Special Topics. 1-5 Credits.

MS 201. Individual Leadership Studies. 2 Credits.
Apply ethics-based leadership skills in oral presentations, writing concisely, planning events, coordinating group efforts, first aid skills, land navigation, and basic military tactics. Focuses on personal development and includes ROTC leadership assessment program. Recommended Coreq: MS 310. F.

MS 202. Leadership and Teamwork. 2 Credits.
Continuation of individual and team building concepts for small unit operations: provides a conceptual framework for decision making, planning, and time management; making safety assessments; introduces movement techniques and pre-execution checks. Recommended Coreq: MS 310. S.

MS 210. Leadership Laboratory. 1 Credit.

MS 291. Seminar. 1-3 Credits.

MS 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MS 294. Individual Study. 1-5 Credits.

MS 299. Special Topics. 1-5 Credits.

MS 301. Leadership and Problem Solving. 3 Credits.
Continuation of individual and team building concepts for small unit operations; provides a conceptual framework for decision making, planning, and time management; making safety assessments; introduces movement techniques and pre-execution checks. Prereq: Departmental approval. Coreq: MS 310. S.

MS 302. Leadership and Ethics. 3 Credits.
Develop skills in planning and leading by conducting training for lower division students. Introduction to operational art and tactics; includes a series of practical opportunities to lead small groups, receive personal assessments and evaluations. Prereq: Departmental approval. Coreq: MS 310. F.

MS 310. Leadership Laboratory. 1 Credit.
Individual and collective drill, small unit leadership experience, and tactical training to lead small groups, receive personal assessments and encouragement, and defensive tactics. Develop skills in planning and leading by conducting training for lower-division students. Weekly lab, physical fitness program, and field exercises required. May be repeated. F.

MS 320. Leadership Laboratory. 1 Credit.
Small unit drill, as well as tactical application of leadership fundamentals at the squad/patrol leader level. May be repeated. S.

MS 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

MS 391. Seminar. 1-3 Credits.

MS 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MS 394. Individual Study. 1-5 Credits.

MS 399. Special Topics. 1-5 Credits.

MS 401. Leadership and Management. 3 Credits.
Plan, conduct, and evaluate activities of the ROTC cadet organization. Articulate goals, put plans into action. Introduce staff organization and processes. Assess organizational cohesion and develop improvement strategies. Apply Army policies. Prereq: Departmental approval. Coreq: MS 410.

MS 402. Officership. 3 Credits.
Continuation of planning, conducting, and evaluating activities of the ROTC cadet organization. Articulate goals, put plans into action. Introduce staff organization and processes. Assess organizational cohesion and develop improvement strategies. Apply Army policies. Prereq: Departmental approval. Coreq: MS 420.

MS 410. Leadership Laboratory. 1 Credit.
Assumption of command and staff positions within the cadet battalion. May be repeated. F.

MS 420. Leadership Laboratory. 1 Credit.
Assumption of command and staff positions within the cadet battalion. May be repeated. S.

MS 491. Seminar. 1-5 Credits.

MS 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MS 494. Individual Study. 1-5 Credits.

MS 496. Field Experience. 1-15 Credits.

MS 499. Special Topics. 1-5 Credits.

Modern Languages (LANG)

LANG 101. Basic ESL: Integrated Skills. 1-20 Credits.
Intensive integrated skills approach to basic English for novice non-native speakers; emphasis on reading, writing, listening and speaking skills needed for academic work. May be repeated. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 102. English Structure for Non-Native Speakers. 5 Credits.
Intensive study and practice of English grammar, focusing on syntax and discourse usage. May be repeated for credit. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 103. English for Non-Native Speakers:Intermediate Grammar & Writing I. 1-5 Credits.
Grammar, usage, syntax, and extensive work with sentence and paragraph structure, stressing unity, and coherence. Emphasis on skills required for academic work. May be repeated. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 104. English for Non-Native Speakers: Vocabulary/Reading. 1-5 Credits.
Intensive instruction in vocabulary and reading skills required for successful completion of university work by speakers of English as a second language (ESL). May be repeated. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 105. English for Non-Native Speakers:Intermediate Grammar/Writing II. 1-5 Credits.
Extended practice in grammar, usage, syntax, and work with paragraph and essay structure. Emphasis on skills needed for academic work. May be repeated. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 106. English for Non-Native Speakers: Oral Skills. 1-5 Credits.
Intensive instruction in speaking and listening skills required for successful completion of university work by speakers of English as a second language (ESL). May be repeated. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 107. Language Use in Writing for ESL I. 1-5 Credits.
Advanced English grammar forms and essay composition for ESL. Focuses on the production and control of grammatical sentences in written communication, with emphasis on skills needed for academic work. May be repeated. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 108. Studies in American Language and Culture. 3 Credits.
This content-based course is designed to deepen understanding of American culture and language through exposure to and study of history, values, and behaviors of American society and subcultures within it. The course provides integrated language skills practice as students use text, film, and classroom discussion to both learn and communicate about American culture.

LANG 109. Language Use in Writing for ESL II. 1-5 Credits.
A continuation of LANG 107. Focuses on production and control of grammatical structures in written communication. Emphasis on skills required for academic work. May be repeated. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 110. Integrated Academic Language Skills for Graduate Students. 5-10 Credits.
Advanced-level integrated language skills and strategies necessary for academic success. Assignments will focus on tasks expected in graduate-level coursework. May be repeated for credit. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 111. Advanced Issues in American and University Culture. 3-5 Credits.
Studies of the culture of America and the university. Designed for advanced language students intending to participate in graduate study. May be repeated for credit. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 112. Advanced Issues in English Language for Non-Native Speakers. 3-5 Credits.
Studies of the language issues that are problematic for advanced level non-native speakers, with a primary focus on skills needed to fully participate in graduate-level programs. May be repeated for credit. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 194. Individual Study. 1-5 Credits.

LANG 196. Field Experience. 1-15 Credits.

LANG 199. Special Topics. 1-5 Credits.

LANG 291. Seminar. 1-5 Credits.

LANG 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

LANG 294. Individual Study. 1-5 Credits.

LANG 299. Special Topics. 1-5 Credits.

LANG 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

LANG 391. Seminar. 1-3 Credits.

LANG 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

LANG 394. Individual Study. 1-5 Credits.

LANG 399. Special Topics. 1-5 Credits.

LANG 406. Oral English Language Strategies and Skills for Presentation. 2 Credits.
This course is designed to help non-native speakers of English speak more effectively and confidently in professional contexts such as research presentations at conferences, competitions, poster sessions, job/internship interviews, or a dissertation defense. {Also offered for graduate credit - see LANG 606.}.

LANG 491H. Seminar. 1-3 Credits.

LANG 491. Seminar. 1-5 Credits.

LANG 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

LANG 494. Individual Study. 1-5 Credits.

LANG 496. Field Experience. 1-15 Credits.

LANG 499. Special Topics. 1-5 Credits.

LANG 606. Oral English Language Strategies and Skills for Presentation. 2 Credits.
This course is designed to help non-native speakers of English speak more effectively and confidently in professional contexts such as research presentations at conferences, competitions, poster sessions, job/internship interviews, or a dissertation defense. {Also offered for undergraduate credit - see LANG 406.}.

LANG 690. Graduate Seminar. 1-5 Credits.

LANG 696. Special Topics. 1-5 Credits.

LANG 701. English Language and Classroom Skills for International GTAs. 3 Credits.
LANG 701 is designed to help international graduate students become effective teachers by developing the language and teaching skills necessary to meet the expectations of undergraduate students at NDSU. Students gain practical experience in classroom leadership, lesson planning, and presenting lessons. Course activities, assignments, readings, and discussions focus on discourse-level proficiency in the culture and rhetoric of the classroom. Students with test scores that don't satisfy language proficiency requirements to TA must also take an oral skills graduate course: LANG 702, LANG 606, or LANG 704. Upon successful completion of 1) LANG 701, 2) a co-requisite graduate-level oral skills course, and 3) a Mock Teaching Exam designed in coordination with their department, students are qualified to be a TA at NDSU. Prereq or Coreq: LANG 702, LANG 606, or LANG 704.

LANG 702. English Language Tutorial for International GTAs. 1 Credit.
In conjunction with LANG 701, this course is designed to help international graduate students become effective teachers by developing the language necessary to meet the expectations of undergraduate students at NDSU. Assignments and one-on-one tutorials are designed to identify individual language deficiencies and to improve on assessed needs. Can be repeated for credit. Co-req: LANG 701.

LANG 704. Language Strategies For Literature Reviews. 3 Credits.
Linguistic strategies develop critical reading and oral skills for literature reviews and academic discourse, both for discipline-specific and cross-disciplinary contexts. Computational and corpus-based tools are used to advance each graduate student's practical understanding of the vocabulary, themes, and rhetorical moves in their field of study and on a particular topic. Through comprehensive readings in a student-selected domain of scholarship, the student will gain expertise in a topic of research and practice in speaking professionally about the themes, trends, results and ideas that emerge from those readings. NB: This course is multidisciplinary and designed for graduate writers across a variety of language competencies. It is appropriate for both native and non-native speakers of English.

LANG 709. Language Strategies for Research Writing. 3 Credits.
Linguistic analysis, grammar instruction, and intensive writing practice will develop language skills for academic and professional writing.

LANG 790. Graduate Seminar. 1-5 Credits.

LANG 793. Individual Study/Tutorial. 1-5 Credits.

LANG 796. Special Topics. 1-5 Credits.

Music (MUSC)

MUSC 100. Music Appreciation. 3 Credits.
Understanding and appreciating musical styles and composers with some emphasis on the relationship of music to concurrent social and artistic trends. Designed for non-music majors.

MUSC 101. Fundamentals of Music. 3 Credits.
Introduction to fundamental elements of music through the study of scales, chords, basic harmonic progressions, rhythms, and terminology.

MUSC 103. Introduction to Music History. 3 Credits.
Introduction to the major works of music in the Western tradition which define the stylistic elements of musical periods in history.

MUSC 108. Roots of American Popular Music. 3 Credits.
Survey of American popular music and musicians from Civil War times through the present with an emphasis on historical and sociological influences. Designed for non-music majors.

MUSC 109. World Music. 3 Credits.
Survey of music from around the world's cultures with an emphasis on commonalities and differences found in the human experience of music.

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 116. Cantemus. 1 Credit.
A non-auditioned soprano/alto choir which will perform music of all style periods. May be repeated for credit.

MUSC 117. Statesmen of NDSU. 1 Credit.
A non-auditioned tenor/bass choir which will perform music of all style periods. May be repeated for credit.

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 with a grade of C or higher. 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. Prereq: MUSC 132 with a grade of C or higher and corequisite of 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, performance majors, composition majors, and musical theatre 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, performance, and composition majors. Prereq: MUSC 160 with a grade of C or higher.

MUSC 162. Voice Class. 1 Credit.
Group instruction in the fundamentals of singing. For music students who do not major in voice. May be repeated.

MUSC 163. Voice Class for Instrumentalists. 2 Credits.
Group instruction in the fundamentals of singing. For instrumental music education students who do not major in voice. May be repeated. Instrumental music majors only.

MUSC 165. Applied Piano. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated.

MUSC 166. Applied Composition. 1 Credit.
Introductory individual lessons in composition focusing on mastering simple compositional techniques in both melody and harmony. May be repeated for credit. Prereq: MUSC 132.

MUSC 167. Applied Voice. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated.

MUSC 168. Applied Wind Instruments. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated.

MUSC 169. Applied Percussion Instruments. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated.

MUSC 170. Applied Upper Strings. 1 Credit.
Individual lessons for upper strings. May be repeated.

MUSC 171. Applied Lower Strings. 1 Credit.
Individual lessons for lower strings. May be repeated.

MUSC 172. Applied Guitar. 1 Credit.
Individual lessons for guitar. May be repeated.

MUSC 173. Supplementary Applied Study. 1-4 Credits.
Private lessons. For music performance majors. Supplementary pedagogy study may be from 1 - 4 credits. May be repeated. Prereq: Qualifying examination in performance.

MUSC 174. Pronunciation for Singers I. 1 Credit.
Instruction in the proper pronunciation of English, Italian, Spanish, and Latin for song, oratorio, and opera.

MUSC 175. Pronunciation for Singers II. 1 Credit.
Instruction in the proper pronunciation of German and French for song, oratorio, and opera. Prereq: MUSC 174.

MUSC 180. Performance Attendance. 0 Credits.
Attendance at regional performances, including NDSU events. Minimum of five registrations necessary for graduation for music majors, two registrations for music minors. May be repeated. P/F only.

MUSC 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

MUSC 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 131 with a grade of C or higher and corequisite of 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 with a grade of C or higher and corequisite of MUSC 233.

MUSC 232. Ear Training & Sight Singing III. 1 Credit.
Intermediate work with ear training and sight singing materials. Laboratory band and chorus required. Prereq: MUSC 133 with a grade of C or higher and corequisite of 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. Prereq: MUSC 232 with a grade of C or higher and corequisite of MUSC 231.

MUSC 260. Piano Class III. 1 Credit.
Intermediate group instruction in playing the piano. Designed primarily to meet the piano proficiency requirements for music education, performance, and composition majors. Prereq: MUSC 161 with a grade of C or higher.

MUSC 261. Piano Class IV. 1 Credit.
Intermediate group instruction in playing the piano. Designed primarily to meet the piano proficiency requirements for music education, performance, and composition majors. Prereq: MUSC 260 with a grade of C or higher.

MUSC 265. Applied Piano. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 266. Applied Composition. 1 Credit.
Individual lessons in composition for a variety of musical media. May be repeated. Prereq: MUSC 166.

MUSC 267. Applied Voice. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 268. Applied Wind Instruments. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 269. Applied Percussion Instruments. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 270. Applied Upper Strings. 1 Credit.
Individual lessons for upper strings. May be repeated.

MUSC 271. Applied Lower Strings. 1 Credit.
Individual lessons for lower strings. May be repeated.

MUSC 272. Applied Guitar. 1 Credit.
Individual lessons for guitar. May be repeated.

MUSC 273. Supplementary Applied Study. 1-4 Credits.
For music performance majors. Supplementary pedagogy study may register for 1-4 credits. May be repeated.

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 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 21st century. Prereq: MUSC 340 with a grade of C or higher, or permission of the instructor and music advisor.

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 351. Instrumental Conducting & Literature. 2 Credits.
Fundamentals and techniques of conducting instrumental ensembles with practical application through the study of instrumental literature.

MUSC 352. Choral Conducting & Literature. 2 Credits.
Fundamentals and techniques of conducting choral ensembles with practical application through the study of choral literature. Prereq: MUSC 103 and MUSC 250.

MUSC 353. Woodwind Methods I. 2 Credits.
Class instruction in woodwind instruments for vocal and instrumental music education majors. Emphasis on pedagogical principles, applied competency of fundamentals, and literature.

MUSC 354. Woodwind Methods II. 2 Credits.
Class instruction in woodwind instruments for instrumental music education majors. Emphasis on advanced pedagogical principles, applied competency of fundamentals and in-depth coverage of literature.

MUSC 355. Brass Methods. 2 Credits.
Class instruction in brass instruments for vocal and instrumental music education majors. Emphasis on pedagogical principles, applied competency of fundamentals, and literature.

MUSC 357. Marching Band Methods and Techniques. 1 Credit.
This course is intended to assist in developing the skills and knowledge essential for the successful administration and implementation of a sports band (marching and pep bands) program within the public school context. Prereq: Students must be music majors.

MUSC 358. Jazz Methods. 1 Credit.
This course is intended to assist in developing the skills and knowledge essential for the successful administration and implementation of a jazz program (Big Band and Combos) within the public school context. Prereq: music majors only.

MUSC 359. Percussion Methods. 2 Credits.
Class instruction in percussion instruments for music education majors. Emphasis on pedagogical principles, applied competency, and literature.

MUSC 364. Jazz Improvisation. 2 Credits.
Basic concepts necessary to play and teach the fundamentals of jazz improvisation. May be repeated.

MUSC 365. Applied Piano. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 366. Applied Composition. 1 Credit.
Individual lessons in composition for a variety of musical media. May be repeated. Prereq: MUSC 266.

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. 1-4 Credits.
For music performance majors. Supplementary pedagogy study may register for 1-4 credits. May be repeated.

MUSC 379. Study Tour Abroad. 3 Credits.
Musical tour of Eastern Europe, including the countries of Hungary, Slovakia, Austria and the Czech Republic.

MUSC 380. Recital. 1 Credit.
Preparation and presentation of a half recital in instrumental, keyboard, or vocal performance. May be repeated.

MUSC 384. Composition I. 1 Credit.
This course will serve as an introduction to compositional techniques. Group and private instruction will be given during the semester. Prereq: MUSC 231.

MUSC 385. Music Entrepreneurship. 3 Credits.
Students will learn and display entrepreneurial skills through class work, guest lectures, and project-based activities and assignments in technology, business, writing, promotion, networking, and other music professional studies.

MUSC 391. Seminar. 1-3 Credits.

MUSC 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MUSC 394. Individual Study. 1-5 Credits.

MUSC 399. Special Topics. 1-5 Credits.

MUSC 411. Form and Analysis. 3 Credits.
Study of the types of tonal relationships which create musical works of art. Examination of small forms such as motive and phrase, and progressing to large forms such as fugue, variation, and sonata. Prereq: MUSC 231. {Also offered for graduate credit - see MUSC 611.}.

MUSC 423. Piano Pedagogy. 3 Credits.
Approaches to piano teaching of beginning to advanced students. May be repeated. {Also offered for graduate credit - see MUSC 623}.

MUSC 430. Counterpoint. 3 Credits.
Study of contrapuntal techniques of the Renaissance and Baroque periods through analysis and composition exercises. Prereq: MUSC 231. {Also offered for graduate credit - see MUSC 630.}.

MUSC 431. Contemporary Harmonic Techniques. 3 Credits.
Study of harmonic and contrapuntal techniques of contemporary composers, with exercises in writing in the various styles. Prereq: MUSC 231. {Also offered for graduate credit - see MUSC 631.}.

MUSC 434. Analytical Techniques. 3 Credits.
Analysis of music of all periods, using a variety of techniques. Music to be analyzed will vary with each offering; may be repeated with permission of instructor. Prereq: MUSC 231. {Also offered for graduate credit - see MUSC 634.}.

MUSC 441. Symphonic Literature. 2 Credits.
Survey of the history of symphonic literature with emphasis on selected works. Prereq: Permission of instructor. {Also offered for graduate credit - see MUSC 641.}.

MUSC 442. Opera Literature. 2 Credits.
Survey of the history of opera with emphasis on selected works. Prereq: MUSC 340 and MUSC 341 or consent of instructor. {Also offered for graduate credit - see MUSC 642.}.

MUSC 443. Keyboard Literature. 3 Credits.
Survey of keyboard styles, instrumental development, and literature (excluding organ) from the early 14th century through the 21st century, with special emphasis on works from 1775-1925. Prereq: Permission of instructor. May be repeated. {Also offered for graduate credit - see MUSC 643.}.

MUSC 465. Applied Piano. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 466. Applied Composition. 1 Credit.
Individual lessons in composition for a variety of musical media. May be repeated. Prereq: MUSC 366.

MUSC 467. Applied Voice. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 468. Applied Wind Instruments. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 469. Applied Percussion Instruments. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 470. Applied Upper Strings. 1 Credit.
Individual lessons for upper strings. May be repeated.

MUSC 471. Applied Lower Strings. 1 Credit.
Individual lessons for lower strings. May be repeated.

MUSC 472. Applied Guitar. 1 Credit.
Individual lessons for guitar. May be repeated.

MUSC 473. Supplementary Applied Study. 1-4 Credits.
For music performance majors. Supplementary pedagogy study may register for 1-4 credits. May be repeated.

MUSC 480. Recital. 1 Credit.
Capstone for performance majors. May be repeated.

MUSC 481. Instrumental Music Methods. 2 Credits.
Specialized methods and classroom practices dealing with teaching instrumental music at the secondary level.

MUSC 482. Choral Music Methods. 2 Credits.
Specialized methods and classroom practices dealing with teaching choral music at the secondary level.

MUSC 483. Elementary Music Methods. 2 Credits.
Specialized methods and classroom practices dealing with teaching elementary music.

MUSC 484. Composition II. 1 Credit.
This course will continue study of compositional techniques and will require finished compositions for performances. Group and private instruction will be given during the semester. Prereq: MUSC 231 and MUSC 384.

MUSC 491. Seminar. 1-5 Credits.

MUSC 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MUSC 494. Individual Study. 1-5 Credits.

MUSC 496. Field Experience. 1-15 Credits.

MUSC 499. Special Topics. 1-5 Credits.

MUSC 611. Form and Analysis. 3 Credits.
Study of the types of tonal relationships which create musical works of art. Examination of small forms such as motive and phrase, and progressing to large forms such as fugue, variation, and sonata. {Also offered for undergraduate credit - see MUSC 411.}.

MUSC 623. Piano Pedagogy. 3 Credits.
Approaches to piano teaching of beginning to advanced students. May be repeated. {Also offered for undergraduate credit - see MUSC 423.}.

MUSC 630. Counterpoint. 3 Credits.
Study of contrapuntal techniques of the Renaissance and Baroque periods through analysis and composition exercises. {Also offered for undergraduate credit - see MUSC 430.}.

MUSC 631. Contemporary Harmonic Techniques. 3 Credits.
Study of harmonic and contrapuntal techniques of contemporary composers, with exercises in writing in the various styles. {Also offered for undergraduate credit - see MUSC 431.}.

MUSC 634. Analytical Techniques. 3 Credits.
Analysis of music of all periods, using a variety of techniques. Music to be analyzed will vary with each offering; may be repeated with permission of instructor. {Also offered for undergraduate credit - see MUSC 434.}.

MUSC 641. Symphonic Literature. 2 Credits.
Survey of the history of symphonic literature with emphasis on selected works. Prereq: Permission of instructor. {Also offered for undergraduate credit - see MUSC 441.}.

MUSC 642. Opera Literature. 2 Credits.
Survey of the history of opera with emphasis on selected works. Prereq: consent of instructor. {Also offered for undergraduate credit - see MUSC 442.}.

MUSC 643. Keyboard Literature. 3 Credits.
Survey of keyboard styles, instrumental development, and literature (excluding organ) from the early 14th century through the 21st century, with special emphasis on works from 1775-1925. May be repeated. Prereq: Permission of instructor. {Also offered for undergraduate credit - see MUSC 443.}.

MUSC 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MUSC 701. Psychology Of Music. 3 Credits.
Study of acoustics, the anatomy and physiology of hearing, and how the listener perceives music and sound.

MUSC 702. Graduate Theory Survey. 3 Credits.
This course is structured as a theory review course for graduate students in music. It will enable students to be able to do advanced course work in analytical studies and other technical graduate courses.

MUSC 703. Foundations of Music Education. 3 Credits.
This course is designed to provide a comprehensive view of the basic foundations inherent in the study of music education at the graduate level, with the emphasis on the development of a personal philosophical perspective that accounts for historical, philosophical, practical and sociological perspectives. Prereq: admission to the Master of Music program.

MUSC 704. Graduate Music History Survey. 3 Credits.
Reading, discussion and listening assignments covering music from the Medieval period through the 21st Century.

MUSC 705. Graduate Diction Survey I. 2 Credits.
A survey of diction training in English and Italian.

MUSC 706. Graduate Diction Survey II. 2 Credits.
A survey of diction training in German and French.

MUSC 709. Graduate Ensemble. 1 Credit.
Ensemble registration for graduate students. Study and performance of major works of each ensemble. May be repeated.

MUSC 713. Advanced Choral Music Methods. 3 Credits.
Advanced study of current choral music methods, materials and assessment strategies. The course will focus on implementation of teaching strategies into choral music classrooms to increase student learning and understanding. Additional information and resources will be studied and used to develop effective secondary music curriculum guidelines. Prereq: admission to graduate studies in music.

MUSC 714. Advanced Elementary Music Methods. 3 Credits.
Advanced study of current elementary music methodologies and the implementation of teaching strategies into elementary music classrooms. Additional information and resources will be studied and used to develop effective elementary music curriculum guidelines. Prereq: admission to the Master of Music in Music Education program.

MUSC 715. History of Choral Literature. 3 Credits.
A survey of the history of choral literature from the Renaissance to the present, with special emphasis on representative compositions in both large and small forms.

MUSC 721. Advanced Vocal Pedagogy. 3 Credits.
In-depth study of the physical and physiological considerations of vocal technique with application to specific voices and suitable repertoire. May be repeated.

MUSC 722. Applied Instrumental Pedagogy. 1-3 Credits.
Advanced study of the physical and physiological considerations of instrumental technique with application to specific instruments and suitable repertoire. May be repeated.

MUSC 731. Applied Study. 1-4 Credits.
Private applied music study (instrumental, keyboard, vocal, conducting). Course credit determined by program and recommendation of instructor. May be repeated.

MUSC 733. Choral Studies and Pedagogy. 2 Credits.
Topics in advanced choral pedagogy, historical performance practice, graduate level applied conducting and other choral studies will be explored. This course may be repeated once by MM students and up to 3 times by DMA choral conducting students. Prereq: admission to the MM or DMA in choral conducting.

MUSC 735. Music Theory Pedagogy I. 3 Credits.
Organization, goals, and procedures for teaching music theory and ear training to undergraduates, with an emphasis on ear training. Topics include: choice and sequencing of topics, pacing of courses, supplementary materials, educational philosophies, and the relevance of theory, ear training, and analysis to performance. Restrictions: Students must be admitted as a graduate student in the Challey School of Music in good academic standing.

MUSC 736. Music Theory Pedagogy II. 3 Credits.
Organization, goals, and procedures for teaching music theory and ear training to undergraduates, with an emphasis on written theory. Topics include: choice and sequencing of topics, pacing of courses, supplementary materials, educational philosophies, and the relevance of theory, ear training, and analysis to performance. Prereq: Students must have successfully passed either 1) the theory portion of the graduate diagnostic exam or 2) MUSC 702: Graduate Theory Survey. Restrictions: Students must be admitted as a graduate student in good academic standing.

MUSC 740. Medieval/Renaissance Music History. 3 Credits.
In-depth historical study of Medieval and Renaissance musical styles and genres through critical listening, discussions, and student and instructor presentations.

MUSC 741. Baroque and Classical Music History. 3 Credits.
In-depth historical study of Baroque and Classical musical styles and genres through critical listening, discussions, and student and instructor presentations.

MUSC 743. Romantic Music History. 3 Credits.
In-depth historical study of Romantic musical styles and genres through critical listening, discussions, and student and instructor presentations.

MUSC 744. 20th & 21st Century Music History. 3 Credits.
In-depth study of the 20th century musical language and compositional values and goals through critical listening, score analysis, discussions, and student and instructor presentations.

MUSC 745. Music History Seminar. 3 Credits.
An in-depth aural, interpretational, and factual study of a specific category of composition, style, or composer through individual study, listening, and in-class exchanges of ideas. Restrictions: A graduate student in Music in good standing or by consent of instructor.

MUSC 746. Topics in Song Literature. 3 Credits.
An in-depth study of the classical song literature of a national song school to be chosen by the instructor and based on the needs of the students. Topics will rotate among national song schools focused on a single language or related languages, e.g. English, French, German, Italian, or Russian song, etc. May be repeated for credit.

MUSC 748. Music Bibliography/Research Methods. 2 Credits.
Introduction to music reference works, general music bibliography, and research methods.

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 771. Orff Schulwerk Level I. 3 Credits.
An introduction to the teaching philosophy, techniques and classroom application of the basic Orff methodology. Students participate in recorder study and movement skills each day while studying the elements of music including improvisation.

MUSC 772. Orff Schulwerk Level II. 3 Credits.
An in-depth study of the teaching philosophy, technique and classroom application of the Orff-Schulwerk methodology. Students further develop their knowledge of classical compositions, recorder study, orchestration techniques and movement skills each day while studying the elements of music including improvisation. Prereq: MUSC 771.

MUSC 773. Orff Schulwerk Level III. 3 Credits.
Pedagogical study for classroom integration of the teaching philosophy, technique and classroom application of the Orff-Schulwerk methodology. Students further develop their knowledge of classical forms, modes, compositions, recorder study, orchestration techniques and movement skills each day while studying the elements of music including improvisation. May be repeated. Prereq: MUSC 771, MUSC 772.

MUSC 780. Recital. 2-4 Credits.
Preparation and presentation of a professional full-length recital in instrument, keyboard, vocal, or conducting performance, with accompanying document. May be repeated for credit.

MUSC 789. D.M.A. Thesis. 1-4 Credits.
Preparation of a capstone written document for the Doctor of Musical Arts degree. At least three registrations required for the Music Education track. At least one registration required for the Performance and Conducting tracks. Restricted to Doctor of Musical Arts program students only.

MUSC 790. Graduate Seminar. 1-5 Credits.

MUSC 791. Temporary/Trial Topics. 1-5 Credits.

MUSC 793. Individual Study/Tutorial. 1-5 Credits.

MUSC 794. Practicum. 1-8 Credits.

MUSC 796. Special Topics. 1-5 Credits.

Natural Resources Management (NRM)

NRM 150. Natural Resource Management Orientation. 1 Credit.
Introduction to natural resources management issues, concepts, and careers.

NRM 199. Special Topics. 1-5 Credits.

NRM 225. Natural Resources & Agrosystems. 3 Credits.
Introduction to scientific theories and their relation to natural resources and agriculture. Influence of these theories on current perspectives toward the environment. 3 lectures. Cross-listed with RNG 225.

NRM 264. Natural Resource Management Systems. 3 Credits.
General principles of natural resource management, including soil and water conservation, soil and wind erosion, use of tillage and vegetation for conservation, drainage, irrigation, and soil and water quality. 3 lectures. Prereq: MATH 103, MATH 104 or MATH 107. Cross-listed with ASM 264 and SOIL 264.

NRM 291. Seminar. 1-3 Credits.

NRM 322. Environmental Law and Policy. 3 Credits.
This course explores selected environmental laws with discussions of federal, state, and local laws; management of natural resources via regulatory policies; and the legal system including levels of government, types of law, and mechanisms for regulating externalities. Prereq: Junior standing.

NRM 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

NRM 391. Seminar. 1-3 Credits.

NRM 394. Individual Study. 1-5 Credits.

NRM 397. Fe/Coop Ed/Internship. 1-4 Credits.

NRM 401. Urban-Ecosystem Management. 3 Credits.
An interdisciplinary management survey examining the urban/rural interface and environmental and social factors driving the process of urbanization as a sustainable ecosystem. {Also offered for graduate credit - see NRM 601.}.

NRM 402. River and Stream Resource Management. 3 Credits.
The structure and function of river and stream ecosystems: biotic and abiotic functioning, stream and river ecological theories, management and monitoring practices. {Also offered for graduate credit - see NRM 602.}.

NRM 420. Sustainable Scenarios in Natural Resources Management. 3 Credits.
An interdisciplinary course to investigate the key competencies needed for sustainable social-ecological systems and how sustainable scenarios can be built for the future management of natural resources. {Also offered for graduate credit - see NRM 620.}.

NRM 421. Environmental Outreach Methods. 3 Credits.
Introduction to philosophies, theories, and methods common to environmental education and outreach. Prereq: Junior or senior standing. {Also offered for graduate credit - see NRM 621.}.

NRM 431. National Environmental Policy Act and Environmental Impact Assessment. 3 Credits.
This course will give students insight into the process of NEPA, its development and how to implement NEPA in the world today. The course will also discuss in-depth the processes for completing environmental assessments and environmental impact statements. Prereq: Junior or senior standing. {Also offered for graduate credit - see NRM 631.}.

NRM 452. Managing Natural and Rangeland Resources using GIS. 3 Credits.
The application of Geographic Information Systems to managing natural and rangeland resources will be investigated. Different natural and rangeland resource datasets, analysis methods, and software packages will be utilized. Cross-listed with RNG 452 and SOIL 452. Dual-listing: NRM 652.

NRM 453. Rangeland Resources Watershed Management. 3 Credits.
Study of the management of physical/biological settings and processes along with human activities on water and watersheds considering preventative and restorative strategies in a rangeland setting. Prereq: RNG 136 or NRM 225. Cross-listed with RNG 453. {Also offered for graduate credit - see NRM 653.}.

NRM 454. Wetland Resources Management. 3 Credits.
Principles of wetland systems, wetland management, wetland functions, wetland delineation, wetland assessment, and wetland improvement. Prereq: SOIL 210. Cross-listed with RNG 454 and SOIL 454. F (even years) {Also offered for graduate credit - see NRM 654.}.

NRM 456. Ecological Restoration. 3 Credits.
This course reviews ecological concepts inherent to ecosystem structure and function, including plant, soil, and animal ecology, and ecosystem response to disturbance. Furthermore, the course will illustrate how this ecological knowledge is used along with socioeconomic information to develop and implement effective restoration projects in both terrestrial and aquatic ecosystems. Cross-listed with RNG 456 and SOIL 456. Dual-listing: RNG 656, NRM 656 and SOIL 656.

NRM 462. Natural Resource and Rangeland Planning. 3 Credits.
Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Prereq: at least senior standing and must be a Natural Resources Management, Range Science or Soil Science major. Cross-listed with RNG and SOIL. {Also offered for graduate credit - see NRM 662.}.

NRM 491. Seminar. 1-5 Credits.

NRM 493. Undergraduate Research. 1-5 Credits.

NRM 494. Individual Study. 1-5 Credits.

NRM 496. Field Experience. 1-15 Credits.

NRM 499. Special Topics. 1-5 Credits.

NRM 601. Urban-Ecosystem Management. 3 Credits.
An interdisciplinary management survey examining the urban/rural interface and environmental and social factors driving the process of urbanization as a sustainable ecosystem. {Also offered for undergraduate credit - see NRM 401.}.

NRM 602. River and Stream Resource Management. 3 Credits.
The structure and function of river and stream ecosystems: biotic and abiotic functioning, stream and river ecological theories, management and monitoring practices. {Also offered for undergraduate credit - see NRM 402.}.

NRM 620. Sustainable Scenarios in Natural Resources Management. 3 Credits.
An interdisciplinary course to investigate the key competencies needed for sustainable social-ecological systems and how sustainable scenarios can be built for the future management of natural resources. {Also offered for undergraduate credit - see NRM 420.}.

NRM 621. Environmental Outreach Methods. 3 Credits.
Introduction to philosophies, theories, and methods common to environmental education and outreach. {Also offered for undergraduate credit - see NRM 421.}.

NRM 631. National Environmental Policy Act & Environental Impact Assessment. 3 Credits.
The interaction and effects of the National Environmental Policy Act (NEPA) with national environmental policy; implementation of the NEPA; public opinion on the state of the environment; introduction to EIS (Environmental Impact Statements). {Also offered for undergraduate credit - see NRM 431.}.

NRM 652. Managing Natural and Rangeland Resources using GIS. 3 Credits.
The application of Geographic Information Systems to managing natural and rangeland resources will be investigated. Different natural and rangeland resource datasets, analysis methods, and software packages will be utilized. Cross-listed with RNG 652 and SOIL 652. Dual-listing: NRM 452.

NRM 653. Rangeland Resources Watershed Management. 3 Credits.
Study of the management of physical/biological settings and processes along with human activities on water and watersheds considering preventative and restorative strategies in a rangeland setting. Cross-listed with RNG 653. {Also offered for undergraduate credit - see NRM 453.}.

NRM 654. Wetland Resource Management. 3 Credits.
Principles of wetland systems, wetland management, wetland functions, wetland assessment, and wetland improvement. {Also offered for undergraduate credit - see NRM 454.}.

NRM 656. Ecological Restoration. 3 Credits.
This course reviews ecological concepts inherent to ecosystem structure and function, including plant, soil, and animal ecology, and ecosystem response to disturbance. Furthermore, the course will illustrate how this ecological knowledge is used along with socioeconomic information to develop and implement effective restoration projects in both terrestrial and aquatic ecosystems. Cross-listed with RNG 656 and SOIL 656. Dual-listing: NRM 456.

NRM 662. Natural Resource and Rangeland Planning. 3 Credits.
Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Cross-listed with RNG and SOIL. {Also offered for undergraduate credit - see NRM 462.}.

NRM 670. Landscape Genetics. 2 Credits.
This course covers the theory and application of landscape genetics, a combination of population genetics and landscape ecology, for the management of aquatic and terrestrial systems.

NRM 671. Landscape Genetics Lab. 1 Credit.
This course covers the theory and application of landscape genetics, a combination of population genetics and landscape ecology, for the management of aquatic and terrestrial systems. Coreq: NRM 670.

NRM 690. Graduate Seminar. 1-3 Credits.

NRM 695. Field Experience. 1-15 Credits.

NRM 696. Special Topics. 1-5 Credits.

NRM 701. Terrestrial Resources Management. 3 Credits.
Management and ecology of heterogeneous landscapes where ecosystem processes and human activities interact as dynamic components. Prereq: BOT 660 and BOT 754.

NRM 702. Natural Resources Management Planning. 3 Credits.
Presentation of the principles, practices and key policy issues of natural resources management and planning.

NRM 720. Natural Resource Administration & Policy. 2 Credits.
A comprehensive analysis of the theory of externalities and their application to the design of natural resources policy.

NRM 761. Current Issues in Natural Resource Management. 1 Credit.
The class will survey current issues in natural resource management. The survey will provide a way to stimulate critical thinking on those issues.

NRM 790. Graduate Seminar. 1-3 Credits.

NRM 791. Temporary/Trial Topics. 1-5 Credits.

NRM 792. Graduate Teaching Experience. 1-6 Credits.

NRM 793. Individual Study. 1-5 Credits.

NRM 794. Practicum. 1-10 Credits.

NRM 795. Field Experience. 1-15 Credits.

NRM 796. Special Topics. 1-5 Credits.

NRM 797. Master's Paper. 1-3 Credits.

NRM 798. Master's Thesis. 1-10 Credits.

NRM 892. Graduate Teaching Experience. 1-6 Credits.

NRM 895. Field Experience. 1-15 Credits.

NRM 899. Doctoral Dissertation. 1-15 Credits.

New Institutional Social Science (NISS)

NISS 701. Survey of New Institutional Social Science. 1 Credit.
Introduction to institutional perspectives in economics, political science, psychology, and sociology. Prereq: Acceptance into the New Institutional Social Science certificate program.

NISS 710. Workshop in New Institutional Social Science. 3 Credits.
Workshop incorporating multiple methodologies with a focus on developing research topics that include institutional analysis. Capstone experience for the graduate certificate in New Institutional Social Science. Prereq: NISS 701, ECON 762, POLS 762 and either PSYC 670 or SOC 733.

NISS 793. Individual Study/Tutorial. 1-5 Credits.

Nursing (NURS)

NURS 150. Academic Success and Career Exploration. 1 Credit.
The course will provide an introduction to the nursing profession and immerse students in activities to facilitate academic success, teamwork, and professionalism.

NURS 194. Individual Study. 1-5 Credits.

NURS 196. Field Experience. 1-15 Credits.

NURS 199. Special Topics. 1-5 Credits.

NURS 211. Perspectives for Wellness. 3 Credits.
This course will explore multiple perspectives in developing healthy habits for living well that involve the body and the mind. This course is offered completely online and is asynchronous. The duration of the course is 6 weeks.

NURS 291. Seminar. 1-3 Credits.

NURS 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

NURS 294. Individual Study. 1-5 Credits.

NURS 299. Special Topics. 1-5 Credits.

NURS 300. Pharmacology & Pathophysiology for Nursing. 4 Credits.
Principles of pharmacology and pathophysiology are presented in an integrated manner to provide a basis for study of prototype medications in major drug classifications. Emphasis is given to the nursing role in developing a comprehensive approach to the clinical application of drug therapy through the use of the nursing process. Prereq: BIOL 220, BIOL 220L, BIOL 221, BIOL 221L and admission to the Nursing program.

NURS 301. Introduction to Nursing and Evidence Based Practice. 3 Credits.
This course introduces fundamental components of professional nursing and evidence-based practice. Prereq: Admission to the Nursing program.

NURS 303. Introduction to the Nursing Profession. 3 Credits.
This course introduces fundamental components of professional nursing. Focus is on theory and methods of health promotion and teaching-learning. The course also provides an introduction to the community as a setting for nursing practice. Prereq: Admission to the Nursing program.

NURS 305. Transitioning Professional Identity. 3 Credits.
This course will examine the transition from Licensed Practical Nurse to Registered Nurse. The course will integrate components of professionalism, ethics, diversity, information technology, and systems thinking. Prereq: Acceptance into the LPN-to-BSN program at NDSU.

NURS 306. Health Promotion. 3 Credits.
This course focuses on health promotion and introduces the concepts of diversity, equity, inclusion, and social determinants of health. Students learn the importance of positive health and well-being of self, individuals, groups, and communities. Prereq or Coreq: Admission to the Nursing Program.

NURS 307. Concepts of Adult Health Nursing. 3 Credits.
Designed for those with a practical nursing license, this course focuses on foundational and advanced concepts needed for the care of adults. Prereq: Nurs 360. Prereq or Coreq: Admission to the LPN-BSN Program.

NURS 321. Foundations of Nursing I. 3 Credits.
This course will introduce students to the nursing process, basic nursing skills, and clinical decision making. Under the guidance of lab instructors, the student is given opportunities to integrate theoretical knowledge and demonstrate basic nursing skills. Prereq: NURS 301 or NURS 303.

NURS 322. Gerontologic Nursing. 2 Credits.
This course focuses on health, the deviations of health, and the nursing care of the geriatric population. Prereq: NURS 306 and admission to program.

NURS 323. Skills and Concepts of Clinical Nursing. 4 Credits.
This course encompasses concepts integral to nursing such as communication, the nursing process, and providing basic cares. Special topics will emphasize the physiologic, psychologic, and pathophysiologic concepts which provide the foundation for professional nursing care. Basic nursing skills will also be introduced and the student will demonstrate competent performance of these skills in the nursing laboratory. Prereq: Admission to the nursing program.

NURS 326. Immersion I. 1 Credit.
Introduction to the RN to BSN online program expectations as well as support services available to each student, portfolio introduction, and team building. This course is a hybrid course. The class will meet for 1.5 days at the NDSU Fargo site and additional course work will be completed individually by the student online. Prereq: Licensed as a Registered Nurse and admitted to the RN to BSN Track.

NURS 341. Foundations of Clinical Nursing. 3 Credits.
This course emphasizes the physiologic, psychologic, and pathophysiologic concepts that provide the foundation for professional nursing care. Prereq: NURS 321, NURS 360, and BIOC 260.

NURS 342. Adult Health Nursing I. 5 Credits.
This course emphasizes the etiology, pathephysiology, and the nursing care of adult clients experiencing common disorders of body systems. Prereq: NURS 360.

NURS 346. NDSU RN to BSN Immersion II. 1 Credit.
Face-to-face immersion for introduction to the semester's courses, guest speakers with nursing expertise in specialty areas, systems thinking simulation, portfolio update, and team-building workshop. Prereq or Coreq: Admission to the Nursing major in the RN-BSN Track.

NURS 352. Family Nursing I. 4 Credits.
This course focuses on nursing care and health promotion for the childbearing family, and includes identification and care of high-risk clients. Prereq: NURS 300 and NURS 360.

NURS 356. The Essence of Nursing. 3 Credits.
This course will explore the current health care environment with special emphasis on patient-centered care, ethics, professionalism and therapeutic communication. This course is offered completely online. The duration of the course is 8 weeks. Prereq or Coreq: Admission to Nursing major in the RN-BSN 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 the Nursing major.

NURS 362. Family Nursing II. 4 Credits.
Focuses on nursing care of the child and family as client. Includes infancy through adolescence, hospitalized and within the community, acutely ill and chronically ill; common stressors throughout the growing years; strategies for health promotion. Prereq: NURS 300 and NURS 360.

NURS 366. Quality and Safety in Nursing. 3 Credits.
This course focuses on the nurse's role in providing safe, quality health care in health systems. Prereq or Coreq: Admission to the Nursing major in the RN-BSN Track.

NURS 372. Expanded Family Nursing I. 2 Credits.
Builds upon prior learning and knowledge about obstetrical and neonatal nursing care with an increased emphasis on advanced concepts including labor & childbirth, complications of childbearing, and common female reproductive conditions. Prereq: NURS 360.

NURS 374. Expanded Family Nursing II. 2 Credits.
Provides the student an opportunity to integrate prior learning and knowledge about pediatric nursing care with an increased emphasis on growth and development, family dynamics, health promotion, and cultural influences. Prereq: NURS 360.

NURS 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

NURS 382. Clinical Applications in Nursing. 4 Credits.
This course provides clinical applications to reinforce clinical judgment, therapeutic communication, and nursing skills. Students will enhance their understanding of nursing concepts, while integrating informatics and systems thinking. Prereq: NURS 342.

NURS 386. Chronicity Throughout the Lifespan I. 3 Credits.
This course will examine the impact of chronic health conditions on the individual, the family, society, and the health care system. Prereq or Coreq: Admission to the RN to BSN program.

NURS 388. Chronicity Throughout the Lifespan II. 3 Credits.
Students will explore the most common chronic diseases and treatment, including implications for clients, families, society, and health care systems. Co-req: NURS 346, NURS 386.

NURS 391. Seminar. 1-3 Credits.

NURS 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

NURS 394. Individual Study. 1-5 Credits.

NURS 397. Fe/Coop Ed/Internship. 1-4 Credits.

NURS 399. Special Topics. 1-5 Credits.

NURS 402. Mental Health Nursing. 4 Credits.
Synthesis and application of nursing and psychiatric-mental health concepts to promote the wellness of individuals and groups. Prereq: NURS 300 and NURS 360.

NURS 403. Adult Health Nursing II. 1-5 Credits.
Focuses on the etiology, pathophysiology, and nursing care of adult clients experiencing selected clinical problems originating from respiratory and cardiovascular systems, neuro trauma, and multisystem problems. Care of families of clients is also emphasized. Prereq: NURS 300 and NURS 360.

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 300, NURS 342 and NURS 360.

NURS 405. Psychsocial Nursing. 2 Credits.
In this course the student will synthesize prior learning with further exploration of psychosocial nursing. Prereq: Licensure as practical nurse, admission to program.

NURS 406. Community & Public Health Nursing. 4 Credits.
The focus of this course will include the core functions of public health, partnering with the community, primary prevention, creation of healthy environments, service to those at risk, stewardship of resources, and multidisciplinary collaboration. Prereq: NURS 303 and NURS 360 OR NURS 305 and NURS 360 OR NURS 306 and NURS 360.

NURS 407. Adult Health: Complex Problems. 3 Credits.
Designed for persons with a nursing license, this course focuses on the etiology, pathophysiologic mechanisms, and organization of nursing care for adult clients experiencing selected complex stressors. Prereq: NURS 360.

NURS 407L. Expanded Clinical Practice for the LPN-BSN. 3 Credits.
This course focuses on the etiology, pathophysiologic mechanisms, and mental health aspects of nursing care for patients in a variety of settings including medical/surgical, critical care, labor and delivery and simulation. Prereq: NURS 372 and NURS 407.

NURS 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 301.

NURS 420. Evidence-Based Practice and Research in Nursing. 3 Credits.
This course will introduce the research process with the emphasis on developing skills as a consumer of research. Students will gain knowledge in the areas of research methods, critical appraisal of research, and the concepts of evidence-based practice. Prereq or coreq: Admission to LPN-BSN or RN-BSN majors.

NURS 422. Contemporary Issues in Mental Health Nursing. 2 Credits.
This elective course is designed to increase awareness of contemporary issues in mental health nursing, with emphasis on psychiatric disorders in the general hospital, interpersonal violence, addiction, and emotional intelligence. Prereq: admission to the Nursing program.

NURS 426. NDSU RN to BSN Immersion III. 1 Credit.
Synchronous online immersion with introduction to the semester's courses, guest speakers to address nursing roles in the community, portfolio update, and team building projects. Prereq or Coreq: Admission to RN-BSN Program.

NURS 430. Comprehensive Adult Health. 6 Credits.
Focuses on the etiology, pathophysiologic mechanisms, and nursing care of adult patients experiencing selected multiple high acuity patients. Prereq: NURS 300 and NURS 360.

NURS 436. Transcultural Nursing Care. 3 Credits.
Nursing 436 Transcultural Nursing will explore the effects of race and culture on life patterns with special emphasis on health care and health care practices. The course is offered completely online. Duration of the course is eight weeks. Co-req: NURS 426, NURS 446, NURS 446L.

NURS 446. Population Focused Nursing Care. 3 Credits.
The focus of this course will include the core functions of public health, partnering with the community, primary and secondary prevention, creation of healthy environments, service to those at risk, stewardship of resources, and multidisciplinary collaboration. Prereq or Coreq: Admission to the RN to BSN program.

NURS 446L. Population Focused Nursing Care - Clinical. 1 Credit.
This course will provide students the opportunity to collaborate with public health agencies or community sites to implement principles of population-focused care. The experience can be arranged in the student's residence community. Prereq or Coreq: Admission to Nursing major in the RN-BSN program.

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 460 or NURS 463.

NURS 456. RN to BSN Immersion IV. 1 Credit.
Virtual immersion for introduction to the semester's courses. Guest speakers to introduce advancing to master's or doctorate degrees, portfolio update, and leadership workshop. Prereq or Coreq: Admission to RN-BSN major program.

NURS 460. Management, Leadership and Career Development. 3 Credits.
This course focuses on the study of management and leadership concepts and issues in professional nursing. This course will also incorporate a guide for career development. Prereq: NURS 342 or NURS 360.

NURS 462. Nurses as Leaders. 3 Credits.
This course focuses on the study of leadership and management concepts, as well as issues in professional nursing and the changing healthcare environment. Prereq or Coreq: Admission to the RN-BSN Program.

NURS 462L. Nursing Leadership Practicum. 1 Credit.
Students will be paired with a healthcare leader for the clinical experience, which will provide opportunity to analyze leadership styles and skills. Prereq or Coreq: Admission to RN-BSN program.

NURS 463. Leadership and Interprofessional Health Care. 4 Credits.
This course will focus on the roles and responsibilities of the professional nurse within the interdisciplinary healthcare team with an emphasis on management and leadership concepts. Prereq: NURS 303 or NURS 305.

NURS 478. BSN Capstone. 3 Credits.
Students will develop a capstone project to improve an aspect of health care, utilizing knowledge from previous courses, including research and evidence-based practice, leadership, quality and safety. Prereq or Coreq: Admission to the RN-BSN Program.

NURS 479. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

NURS 491. Seminar. 1-5 Credits.

NURS 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

NURS 494. Individual Study. 1-5 Credits.

NURS 496. Field Experience. 1-15 Credits.

NURS 499. Special Topics. 1-5 Credits.

NURS 679. Global Seminar. 1-6 Credits.

NURS 690. Graduate Seminar. 1-3 Credits.

NURS 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

NURS 695. Field Experience. 1-15 Credits.

NURS 696. Special Topics. 1-5 Credits.

NURS 790. Graduate Seminar. 1-3 Credits.

NURS 791. Temporary/Trial Topics. 1-5 Credits.

NURS 793. Individual Study. 1-5 Credits.

NURS 794. Practicum. 1-8 Credits.

NURS 795. Field Experience. 1-15 Credits.

NURS 796. Special Topics. 1-5 Credits.

NURS 797. Master's Paper. 1-3 Credits.

NURS 798. Master's Thesis. 1-10 Credits.

NURS 802. Ethics and Health Policy in Nursing. 2 Credits.
Analyze interactions among common clinical, organizational, societal, and policy decisions from ethical and legal perspectives. Evaluates selected theories and models of decision making and health care.

NURS 804. Nursing Research/Evidence Based Practice. 3 Credits.
Exploration of methodologies of scholarly inquiry in nursing with an emphasis on the utilization of evidenced based practice in the advanced nursing practice role.

NURS 806. Health Care Delivery Systems and Financing. 2 Credits.
Analysis of health care system and financial management for measurement of patient outcomes are the focus of this course. Advanced practice nurses play a leadership role while participating in system decisions including monitoring financial information and promoting quality improvement in managing and utilizing health care.

NURS 808. Informatics in Advanced Nursing Practice. 2 Credits.
Course focuses on the various information and communication technology tools used in the care of patients, communities, and populations. Provides an understanding on how to use information to gather data, create information, and generate knowledge in the delivery of care among providers, patients, and all system levels.

NURS 810. Health Promotion and Disease Prevention. 2 Credits.
This course critically examines patterns of health behaviors, risk assessment, lifestyles, developmental stages, sociocultural, psychological, and spiritual contributions to well-being. Includes data-based assessment and management of preventive health services and common acute and chronic conditions.

NURS 812. Advanced Health Assessment. 3 Credits.
Performance of health histories, complete physical/psychosocial assessments, and developmental assessments of clients from across the lifespan. A laboratory component is included.

NURS 812P. Assessment Practicum. 6 Credits.
In this course the student integrates health history, physical examination and laboratory evaluations in a plan for management of client needs. Prereq: NURS 812.

NURS 814. Advanced Pathophysiology Across the Lifespan I. 2 Credits.
General pathophysiological responses to selected body systems to disease processes are presented from both biological and behavioral perspectives. Emphasis on normal cellular function, developmental changes and common physiological symptoms.

NURS 815. Population Health/Epidemiology for Advanced Practice Nursing. 3 Credits.
Epidemiologic techniques, reporting, and research will be presented. Emphasis is placed on disease prevention and control. Health problems of national and international significance will be examined and strategies for solutions and/or management will be proposed.

NURS 816. Advanced Pathophysiology Across the Lifespan II. 2 Credits.
Builds on the context from NURS 814 with emphasis on normal cellular function, developmental changes and common physiological symptoms. Synergistic clinical manifestations and total body-mind responses to system alterations. Prereq: NURS 814.

NURS 820. Advanced Practice Roles. 3 Credits.
This course addresses scope of practice, legal parameters of advanced practice, and leadership in the advanced practice nursing role. Restrictions: Current 3rd status in the NDSU DNP program.

NURS 828. An Introduction to Primary Care. 2 Credits.
An Introduction to Primary Care clinical decision-making skills fostered in the screening, prevention, and, management of common acute, emergent, and chronic health conditions. Selected case studies of clients in primary care will be examined in relation to problems, diagnoses, plans, and evaluations. Prereq: Enrolled in DNP program.

NURS 830. Clinical Applications. 3 Credits.
Student designs individualized study in an area of focus. Options include extension of a scholarly study, extended clinical practice, intensive study of specialized treatment modality and other appropriate foci. Prereq: NURS 634.

NURS 831. Advanced Pharmacology I. 2 Credits.
Information relative to therapeutic management guidelines for treatment of selected disease processes. Drug information by classification and basic principles of pharmacodynamic and pharmacokinetics, clinical uses, mechanisms of action, contraindications, adverse reactions, and client education implications.

NURS 832. Advanced Pharmacology II. 2 Credits.
Continuation of information relative to therapeutic management guidelines for treatment of selected disease processes. Drug information by classification and basic principles of pharmacodynamic and pharmacokinetics, clinical uses, mechanisms of action, contraindications, adverse reactions, and client education implications. Prereq: NURS 631.

NURS 833. Family Primary Care I:Assessment and Management. 3 Credits.
Clinical decision making skills are fostered in the diagnosis, management, monitoring and evaluation of common acute, emergent, and chronic health conditions. Selected case studies of clients will be examined in relation to problems, diagnoses, plans, and evaluations. Prereq: NURS 812P, NURS 816.

NURS 833P. Family Primary Care:Residency I. 6 Credits.
Student synthesizes skills acquired in previous didactic and clinical courses to provide diagnosis, treatment, and management of an increasingly varied group of clients. Prereq: NURS 833.

NURS 834. Family Primary Care II:Assessment and Management. 3 Credits.
Clinical decision making skills are fostered in the diagnosis, management, monitoring and evaluation of common acute, emergent, and chronic health conditions. Selected case studies of clients will be examined in relation to problems, diagnoses, plans, and evaluations. Prereq: NURS 833.

NURS 834P. Family Primary Care:Residency II. 6 Credits.
Students synthesize skills acquired in previous didactic and clinical courses, in particular NURS 833P, to provide diagnosis, treatment, and management of an increasingly varied group of clients. Prereq: NURS 833P.

NURS 835P. Practicum IV: FNP Role Integration. 6 Credits.
Application of skills and clinical experiences in primary care. Didactic concepts are incorporated in the student's practice, supervised by a health care provider who has documented expertise in the area of specialization. History, physical examinations, and diagnostic analysis will be integrated into evaluation of clients. Prereq: NURS 834P.

NURS 835. Family Primary Care III: Assessment and Management. 2 Credits.
Continuation of Family Primary Care I and II. Focus on health promotion, maintenance, restoration and disease prevention. Application of health-related theories, family dynamics, methods of human genetics, research protocols, ethics, cost effectiveness and legal ramifications for advanced nursing practice. Prereq: NURS 834.

NURS 836P. Practicum V: FNP Role Integration. 7 Credits.
Application of skills and clinical experiences in primary care. Didactic concepts are incorporated in the student's practice, supervised by a health care provider who has documented expertise in the area of specialization. History, physical examinations, and diagnostic analysis will be integrated into evaluation of clients. Prereq: NURS 835P.

NURS 850P. Family Primary Care: Specialty Practicum. 3 Credits.
Students are immersed into a specialty clinical area and supervised by a healthcare provider with expertise in the specialty. Theory, research, and didactic learning are incorporated in the student's clinical experience. Prereq: NURS 834P.

NURS 880. Interprofessional Collaborative Practice. 2 Credits.
Building on prior learning, graduate nursing students will synthesize and analyze interprofessional skills required to assume the role of provider on the healthcare team, such as communication, collaboration, leadership, conflict resolution, consultations, team building, and roles and responsibilities. Prereq: NURS 820.

NURS 890. Seminar. 1-5 Credits.

NURS 893. Individual Study/Tutorial. 1-5 Credits.

NURS 894. Practicum/Internship. 1-8 Credits.

NURS 899S. Clinical Dissertation. 1-15 Credits.
The clinical dissertation is a scholarly work that focuses on practice issues. It involves identification, development, implementation, and evaluation and/or dissemination of an evidence-based project addressing a current clinical issue. Graded 'S' or 'U'.

Pharmaceutical Sciences (PSCI)

PSCI 194. Individual Study. 1-5 Credits.

PSCI 196. Field Experience. 1-15 Credits.

PSCI 199. Special Topics. 1-5 Credits.

PSCI 291. Seminar. 1-3 Credits.

PSCI 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PSCI 294. Individual Study. 1-5 Credits.

PSCI 299. Special Topics. 1-5 Credits.

PSCI 300. Pharmaceutical Organic Chemistry. 5 Credits.
This course provides pre-professional pharmacy students enrolled in the Doctor of Pharmacy Early Admissions Pathway with a comprehensive overview of organic chemistry and related topics relevant to the professional pharmacy curriculum such as structure-activity relationships, drug design, and common pharmaceutical polymers. Prereq: CHEM 121, CHEM 121L, CHEM 122, CHEM 122L. Restricted to students who have conditional acceptance in the NDSU Doctor of Pharmacy program.

PSCI 301. Biochemistry and Molecular Biology for Pharmacists. 5 Credits.
The primary goal in this course is to ensure that students begin to understand how biological processes occur at the molecular level. Students will also study the structure and function of the molecules of living cells, with an emphasis on proteins in the context of antibiotic and other drug interactions. The course will include an introduction to biomolecules, an examination of the generation and use of metabolic energy, biosynthesis, metabolic regulation, and an introduction of the storage, transmission, and expression of genetic information. Prereq: CHEM 342 or PSCI 300. Restricted to students who have conditional acceptance in the NDSU Doctor of Pharmacy program.

PSCI 367. Pharmaceutical Calculations. 1 Credit.
Qualitative and quantitative principles encompassing calculations performed by pharmacists in traditional and specialized practice settings. Scope includes computations related to prescriptions and medication orders. Restricted to students who have conditional acceptance in the NDSU Doctor of 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 Pharm.D. 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 the Pharm.D. program.

PSCI 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PSCI 391. Seminar. 1-3 Credits.

PSCI 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PSCI 394. Individual Study. 1-5 Credits.

PSCI 399. Special Topics. 1-5 Credits.

PSCI 410. Pharmaceutical Biotechnology. 2 Credits.
Current and future biotechnologies in drug discovery, design, and production. Diagnostic technologies for individualized patient therapies. Prereq: admission to PharmD program. {Also offered for graduate credit - see PSCI 610.}.

PSCI 411. Principles of Pharmacokinetics and Pharmacodynamics. 3 Credits.
This course is designed for professional Pharm D students/Graduate Students to learn and understand the basic principles of Pharmacokinetics/ Pharmacodynamics, and then apply them to the patient care setting and scientific research, covering from basic chemical, biochemical, pharmacological principles applied to the study of therapeutic agents, to the pharmacologic properties of drugs that affect their ADME and therapeutic effects. Prereq: Admission to PharmD program. {Also offered for graduate credit - see PSCI 611.}.

PSCI 412. Chemotherapeutic/Infectious Disease Pharmacodynamics. 3 Credits.
Pharmacologic and therapeutic properties of chemotherapeutic agents and anti-infective drugs. Prereq: PSCI 411. {Also offered for graduate credit - see PSCI 612.}.

PSCI 413. Endocrine/Respiratory/GI Pharmacodynamics. 3 Credits.
The pharmacological properties and therapeutic uses of therapeutic agents for the treatment of disorders of the endocrine and GI systems, autonomic nervous system, and anti-inflammation agents, will be covered in this course. Prereq: PSCI 411 with a grade of C or higher. Dual-listing: PSCI 613.

PSCI 414. Cardiovascular Pharmacodynamics. 3 Credits.
Pharmacologic properties of drugs used in the treatment of cardiovascular disorders. Prereq: PHRM 340 and PSCI 411 both with a grade of C or higher. {Also offered for graduate credit - see PSCI 614.}.

PSCI 415. Neuropsychiatry Pharmacodynamics. 3 Credits.
Pharmacological properties of therapeutic agents used in the treatment of central nervous system disorders. Prereq: PHRM 341 and PSCI 411 both with a grade of C or higher. {Also offered for graduate credit - see PSCI 615.}.

PSCI 417. Pharmacogenomics. 2 Credits.
This course provides students with a broad perspective on the emergence of pharmacogenomics as a new field and the potential role of pharmacogenomics in future clinical therapeutics and drug design. Prereq: PSCI 411 with a grade of C or higher. {Also offered for graduate credit - see PSCI 617.}.

PSCI 470. Pharmacokinetics. 3 Credits.
Concepts and mathematical techniques for describing the time course of drugs in biological systems. Prereq: PSCI 411 with a grade of C or higher. {Also offered for graduate credit - see PSCI 670.}.

PSCI 491. Seminar. 1-5 Credits.

PSCI 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PSCI 494. Individual Study. 1-5 Credits.

PSCI 496. Field Experience. 1-15 Credits.

PSCI 499. Special Topics. 1-5 Credits.

PSCI 545. Clinical Toxicology. 2 Credits.
Toxic potential of various poisonous substances including mechanism of toxicity, toxic doses, clinical presentation, clinical and laboratory monitoring and their specific treatment. Prereq: PSCI 411.

PSCI 590. Graduate Seminar. 1-3 Credits.

PSCI 610. Pharmaceutical Biotechnology. 2 Credits.
Current and future biotechnologies in drug discovery, design, and production. Diagnostic technologies for individualized patient therapies. Prereq: Accepted into PSCI Graduate Program and/or department consent. {Also offered for undergraduate credit - see PSCI 410.}.

PSCI 611. Principles of Pharmacokinetics and Pharmacodynamics. 3 Credits.
This course is designed for professional Pharm D students/Graduate Students to learn and understand the basic principles of Pharmacokinetics/ Pharmacodynamics, and then apply them to the patient care setting and scientific research, covering from basic chemical, biochemical, pharmacological principles applied to the study of therapeutic agents, to the pharmacologic properties of drugs that affect their ADME and therapeutic effects. Prereq: Admission into PSCI Graduate Program and/or department consent. {Also offered for undergraduate credit - see PSCI 411.}.

PSCI 612. Chemotherapeutic/Infectious Disease Pharmacodynamics. 3 Credits.
This is a basic pharmacology course. The chemical structure, medicinal and pharmacological properties of therapeutic agents used in the treatment of cancerous and infectious diseases will be covered in this course. Aspects of microbiology, molecular and cell biology, physiology, immunology and pharmacology related to understanding the therapeutic use of these agents will be discussed. Prereq: accepted into PSCI Graduate Program and/or department consent. {Also offered for undergraduate credit - see PSCI 412.}.

PSCI 613. Endocrine/Respiratory/GI Pharmacodynamics. 3 Credits.
The pharmacological properties and therapeutic uses of therapeutic agents for the treatment of disorders of the endocrine and GI systems, autonomic nervous system, and anti-inflammation agents, will be covered in this course. Dual-listing: PSCI 413.

PSCI 614. Cardiovascular Pharmacodynamics. 3 Credits.
Pharmacologic properties of drugs used in the treatment of cardiovascular disorders. Prereq: accepted into PSCI Graduate Program and/or department consent. {Also offered for undergraduate credit - see PSCI 414.}.

PSCI 615. Neuropsychiatry Pharmacodynamics. 3 Credits.
Pharmacological properties of therapeutic agents used in the treatment of central nervous system disorders. Prereq: accepted into PSCI Graduate Program and/or department consent. {Also offered for undergraduate credit - see PSCI 415.}.

PSCI 617. Pharmacogenomics. 2 Credits.
This course provides students with a broad perspective on the emergence of pharmacogenomics as a new field and the potential role of pharmacogenomics in future clinical therapeutics and drug design. Prereq: PSCI 611. {Also offered for undergraduate credit - see PSCI 417.}.

PSCI 670. Pharmacokinetics. 3 Credits.
Concepts and mathematical techniques for describing the time course of drugs in biological systems. Also includes Toxicology. Prereq: Admission to PSCI Graduate program and/or department consent. {Also offered for undergraduate credit - see PSCI 470.}.

PSCI 690. Graduate Seminar. 1-3 Credits.

PSCI 696. Special Topics. 1-5 Credits.

PSCI 701. Quantative Drug Design. 2 Credits.
Modeling of drug disposition and receptor binding with focus on rational development of new drugs and elucidation of action mechanisms.

PSCI 703. Drug Metabolism. 2 Credits.
Drug biotransformations and their effects on drug properties such as duration of action, potency, toxicity, and specificity. Prereq: BIOC 702.

PSCI 746. Neuropharmacology. 3 Credits.
Study of action mechanisms of drugs affecting the central and peripheral nervous systems.

PSCI 747. Cardiovascular Pharmacology. 3 Credits.
Study of action mechanisms of drugs affecting the circulatory systems, including their pathology.

PSCI 762. Advanced Biopharmaceutics. 2 Credits.
Stability and kinetic factors involved in absorption, distribution, metabolism, and excretion of drug products.

PSCI 765. Cancer Cell Biology. 2 Credits.
This course covers the principles of modern cancer cell biology, including topics on oncogenes, tumor suppressor genes, growth factors, signal transduction, cell cycle, apoptosis, angiogenesis, and mechanism of tumor metastasis.

PSCI 767. Biomedical Grant Writing at the Professional Level for Graduate Students. 1 Credit.
Understanding biomedical research funding and how to apply for funding is an essential skill for scientists. In this course, graduate students will learn the basic concepts of the biomedical funding system, concepts of biomedical grant components, grant design, grant preparation, and peer review of grants.

PSCI 790. Graduate Seminar. 1-3 Credits.

PSCI 791. Temporary/Trial Topics. 1-5 Credits.

PSCI 793. Individual Study/Tutorial. 1-5 Credits.

PSCI 795. Field Experience. 1-15 Credits.

PSCI 796. Special Topics. 1-5 Credits.

PSCI 798. Master's Thesis. 1-10 Credits.

PSCI 892. Graduate Teaching Experience. 1-6 Credits.

PSCI 899. Doctoral Dissertation. 1-15 Credits.

Pharmacy Practice (PHRM)

PHRM 170. Common Diseases, Prevention, and Treatment. 2 Credits.
Consumer-oriented introduction to common diseases, their prevention and treatment including common classes of drugs, non-drug treatment, and safe medication use.

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 190. Critical Thinking, Academic, and Professional Skills for the Health Professions. 3 Credits.
This course provides students with opportunities to develop proficient critical thinking and clinical problem-solving skills as they are used in the health professions. This course will also immerse students in reasoning-related activities that facilitate academic success, teamwork, and a demonstrated commitment to the roles and responsibilities required of all health professionals. Cross-listed with ASCI 190 and PH 190.

PHRM 194. Individual Study. 1-5 Credits.

PHRM 196. Field Experience. 1-15 Credits.

PHRM 199. Special Topics. 1-5 Credits.

PHRM 291. Seminar. 1-3 Credits.

PHRM 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHRM 294. Individual Study. 1-5 Credits.

PHRM 299. Special Topics. 1-5 Credits.

PHRM 301. Top Drugs I. 1 Credit.
Introduction to basic knowledge necessary for success in the professional pharmacy curriculum and in the practice of pharmacy. Student will learn brand/generic/indication for all medications on the Top Drug Medication List. Prereq: acceptance into the PharmD program.

PHRM 324. Writing and Professionalization in Pharmacy. 3 Credits.
Study of and practice in language use and written conventions of pharmacy practice and the pharmaceutical sciences. Students practice writing for career development, documenting patient care, evaluating and synthesizing scientific literature, and communicating with patient and professional audiences. Prereq: ENGL 120, junior status, admission to the early admission pathway to the Doctor of Pharmacy program.

PHRM 330. Introduction to Ambulatory Care Pharmacy. 2 Credits.
Pharmacists practicing in ambulatory care take on a variety of responsibilities in varied settings and are central to communities with high levels of interaction with patients of diverse backgrounds and cultures. Ambulatory care pharmacy practice is expanding throughout the country. This elective course provides an introduction to ambulatory care pharmacy. Multiple practice sites and opportunities will be highlighted. Students will learn and apply concepts to propose their own ambulatory care pharmacy practice. Prereq: Requires admission into the PharmD program.

PHRM 340. Patient Assessment and Pathophysiology I. 4 Credits.
Introduction to interviewing skills and physical assessment techniques important for assessing patients and monitoring disease states and drug therapy. Comprehensive study of the normal and abnormal physiological processes and the mechanisms of disease important to the understanding of pharmacology and drug therapy. Prereq: Admission to the Pharmacy program.

PHRM 341. Pathophysiology II. 3 Credits.
Normal and abnormal physiological processes and the mechanisms important to the understanding of pharmacology and drug therapy. Prereq: Admission to the PharmD program.

PHRM 350. Introduction to Pharmacy Practice. 2 Credits.
Issues related to pharmacy practice, patient medication counseling, retrieval of drug information, cultural competency, health literacy, pharmaceutical care plans, and evaluating adverse drug reactions/interactions are discussed. Prereq: Admission to the Pharmacy Program.

PHRM 351L. Pharmacy Practice Laboratory I. 2 Credits.
This course is a hands-on skills laboratory in contemporary pharmacy practice. Learners will engage in activities and simulations which provide opportunities for application of skills relevant to community pharmacy practice. Prereq: Admission to the PharmD program.

PHRM 352. Introduction to Health Care Systems. 2 Credits.
Pharmacy students will be introduced to health professions, health care delivery systems, financing, access, quality, and economic issues. Prereq: Admission to the PharmD program.

PHRM 353. Introduction to Pharmacy and the Health Care System. 3 Credits.
Introduction to the knowledge, skills and attitudes necessary for success in the professional pharmacy curriculum and in the practice of pharmacy. Pharmacy students will be introduced to health professions, health care delivery systems, financing, access, quality, and economic issues. Prereq: admission to the PharmD program.

PHRM 355. Institutional Introductory Pharmacy Practice Experience. 3 Credits.
This course is designed to be an introduction to institution based pharmacy practice. This course consists of a 3 week, 120 hour, unpaid, supervised pharmacy practice experience in an institutional pharmacy setting, required assignments, and required reflection. Pass/Fail grading. Prereq: PHRM 400, PHRM 450, PHRM 452L, PHRM 455, PHRM 532, PHRM 534, PHRM 535, PHRM 538, PHRM 565, PSCI 413, PSCI 414, PSCI 415, PSCI 417 and CHP 400.

PHRM 360. Introduction to Drug Literature. 1 Credit.
Survey of clinical drug literature sources (primary, secondary, and tertiary) and introduction to evaluation of the original literature. Prereq: Admission to the PharmD Program.

PHRM 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PHRM 391. Seminar. 1-3 Credits.

PHRM 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHRM 394. Individual Study. 1-5 Credits.

PHRM 397. Fe/Coop Ed/Internship. 1-4 Credits.

PHRM 399. Special Topics. 1-5 Credits.

PHRM 400. Top Drugs II. 1 Credit.
Introduction to basic knowledge necessary for success in the professional pharmacy curriculum and in the practice of pharmacy. Prereq: PHRM 301 with a grade of C or higher.

PHRM 425. Instructional Design for Health Professionals. 2 Credits.
Build basic skills to design and implement effective instructional activities ranging from pharmacy-specific professional education (e.g. patient education, inter-professional medication-related presentations) to college-level instructional tasks. Prereq: PHRM 353 with a grade of C or higher. {Also offered for graduate credit - see PHRM 625.}.

PHRM 450. Self Care. 3 Credits.
Course designed to provide pharmacy students with the knowledge, skills, and practical tools necessary to provide self care recommendations to patients, physicians, nurses, and other allied health care professionals. Prereq: PHRM 340, PHRM 341 both with a grade of C or higher.

PHRM 452L. Pharmacy Practice Laboratory II. 2 Credits.
This course will afford the learner the knowledge, skill set, and resources needed to practice in an institutional setting. Contextualized, competency-based, learning activities are used to promote analytical reasoning and mastery of learning outcomes. Topics include health-system pharmacy; sterile and nonsterile products; compounding; therapeutic plan formulation using electronic health records; point-of-care testing. Prereq: PHRM 351L with a grade of C or higher.

PHRM 453. Complementary and Alternative Therapies: An Evidence-Based Approach. 2 Credits.
This course is designed to provide health professions students with an overview of each form of complementary and alternative medicine (CAM) commonly practiced in the United States. Students will develop knowledge, skills, and practical tools necessary to understand and evaluate CAM, and provide recommendations for appropriate use to patients or other health care professionals. While specific products will be discussed when appropriate, the emphasis is on broad systems of treatment. Prereq: PHRM 360 or NURS 301 each with a grade of C or better. Dual-listing: PHRM 653.

PHRM 454. Scientific Writing for Health Professionals. 2 Credits.
Explores skills and concepts for communicating with scientific, patient, and public audiences with an emphasis on audience and context analysis. Students will choose projects that advance their professional goals. Prereq: PHRM 360 or PHRM 480 with a grade of C or higher. Dual-listing: PHRM 654.

PHRM 455. Community Introductory Pharmacy Practice Experience. 4 Credits.
This course is designed to be an introduction to community based pharmacy practice. This course consists of a 4 week, 160 hour, unpaid, supervised pharmacy practice experience in a community pharmacy setting, required assignments, and required reflection. Pass/Fail grading. Prereq: PHRM 301, PHRM 340, PHRM 341, PHRM 351L, PHRM 353, PHRM 480, PSCI 367, PSCI 368, PSCI 369, PSCI 410, PSCI 411, PSCI 412, PSCI 470 and MICR 470.

PHRM 475. Pharmacy Practice Management. 3 Credits.
This course introduces students to management techniques applicable to the contemporary practice of pharmacy in community and institutional settings. Prereq: PHRM 350, PHRM 352, PHRM 452L.

PHRM 479. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PHRM 480. Evidence Based Medicine. 2 Credits.
Evaluation of original literature in which drug information is found to achieve a thorough understanding of the structure of the literature and its inherent strengths and weaknesses. Prereq: PHRM 360 with a grade of C or higher.

PHRM 491. Seminar. 1-5 Credits.

PHRM 492. Study Abroad. 1-15 Credits.

PHRM 494. Individual Study. 1-5 Credits.

PHRM 499. Special Topics. 1-5 Credits.

PHRM 500. Top Drugs III. 1 Credit.
Students will build on drug knowledge they have obtained from PHRM 400 to be successful in the practice of pharmacy. Prereq: PHRM 400 with a grade of C or higher.

PHRM 520. Special Populations. 3 Credits.
Focused on providing pharmaceutical care for a variety of populations including men, women, pediatric and geriatric patients. Prereq: PHRM 532, PHRM 537 and PHRM 538, all with a grade of C or better. {Also available for graduate credit - See PHRM 620.}.

PHRM 532. Infectious Disease. 3 Credits.
This course is a clinical, patient-oriented approach to infectious disease. The instructors will review antimicrobial agents combined with specific infectious disease processes and therapies to help the students make appropriate judgments on infectious disease problems. Prereq: MICR 470, PSCI 412. {Also offered for graduate credit - see PHRM 632.}.

PHRM 534. Rheumatology/Endocrinology/Gastrointestinal. 3 Credits.
Pharmacotherapy of disorders involving the musculoskeletal, endocrine, and gastrointestinal systems. Prereq: PSCI 413 with a grade of C or higher.

PHRM 535. Hematology and Oncology. 3 Credits.
This course provides a framework for understanding the role molecular biology plays in the pathophysiology and treatment of the most prevalent oncologic and hematologic malignancies, as well as benign and drug-induced hematologic conditions. Students will apply evidence-based principles in assessing/monitoring appropriate therapy for these patients. Prereq: PSCI 412 with a grade of C or higher.

PHRM 536. Neurology & Psychiatry Pharmacotherapy. 3 Credits.
The course will focus on the principles, selection and management of pharmacotherapy for the major psychiatric and neurologic diseases. Learning methods will include face-to-face lecture, in-class discussion, small group activities, and case formulations. Prereq: PSCI 415. {Also offered for graduate credit - see PHRM 636.}.

PHRM 537. Renal Disease/Fluid and Electrolytes. 2 Credits.
This course focuses on pathophysiology and pharmacotherapy of major renal diseases including fluid and electrolyte disorders, acid/base balance, and renal replacement therapy. Emphasis is placed upon application of knowledge to patient care situations and the mastery of pharmacotherapy. Prereq: PSCI 414 with a grade of C or higher.

PHRM 538. Cardiovascular and Pulmonary Diseases. 4 Credits.
Pharmacoptherapy of cardiovascular and pulmonary diseases. Study of the pathophysiology, clinical presentation, and treatment of various cardiovascular and pulmonary diseases. Prereq: PSCI 413 and PSCI 414 with a grade of C or higher.

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 353 and PHRM 480 both with a grade of C or higher. {Also offered for graduate credit - see PHRM 640.}.

PHRM 545L. Pharmacotherapy Laboratory. 1 Credit.
This is a problem-based and skills-based laboratory integrating the pathophysiology, pharmacology, and therapeutic aspects of various diseases in order to prepare learners to make sound patient-centered therapeutic decisions and provide clinical rationale during the pharmacist's patient care process. The class activities are designed as a team-based approach. Prereq: PHRM 450, PHRM 532, PHRM 534, PHRM 538 completed with a grade of C or higher. Co-req: PHRM 536, PHRM 537.

PHRM 546. Advanced Topics in Neuropsychiatry: Major Neurocognitive Disorders. 2 Credits.
The course will provide the most up-to-date information regarding advanced care and management of patients with select major neurocognitive disorders, previously known as dementia. In addition, reversible causes of cognitive problems will be discussed. Prereq: PHRM 341 and PHRM 536.

PHRM 551L. Pharmacy Practice Laboratory III. 2 Credits.
This course is a hands-on skills laboratory course in contemporary pharmacy practice. Learners will engage in activities and simulations which provide hands-on practice of ambulatory care learning topics in various practice settings. Prereq: PHRM 351L with a grade of C or higher. Coreq: PHRM 545L.

PHRM 552L. Pharmacy Practice Laboratory IV. 2 Credits.
Coursework will assist Doctor of Pharmacy candidates to develop competence in recognizing, analyzing, and resolving drug related problems; providing accurate drug information and education; promoting public health and managing a patient oriented pharmacy practice. Prereq: PHRM 551L and PHRM 545L both with a grade of C or higher.

PHRM 553. Pharmacy-Based Point-of-Care Testing Certificate Program. 1 Credit.
To provide students with the knowledge of assessment, testing, follow-up care and management principles necessary to operate a successful point-of-care testing program in community pharmacies. Successful completion of the course will result in a National Association of Chain Drug Stores Point of Care Testing Certificate. This course is a combination of live lectures and home study material. Prereq: PHRM 452L and PHRM 532 with a grade of C or higher.

PHRM 560. Specialty Care Topics. 2 Credits.
This course will provide knowledge of specialty topics encountered in pharmacy practice. Prereq: PHRM 537, PHRM 538 both completed with a grade of C or higher.

PHRM 565. Pharmacy-Based Immunization Delivery. 1 Credit.
This course will provide knowledge of immunology, vaccine-preventable diseases, indications for vaccination, and implementation and maintenance of a pharmacy-based vaccination program. Prereq: MICR 470.

PHRM 570. Pharmacy Practice Improvement and Project Management. 2 Credits.
Students will gain a basic understanding of performance improvement and projects they may be expected to complete on a rotation or as a new practitioner. Prereq: PHRM 353 (or PHRM 350 and PHRM 352) and PHRM 480 with a Grade of C or better. {Also offered for graduate credit - see PHRM 670.}.

PHRM 572. Pharmacy Law and Ethical Considerations. 3 Credits.
Pharmaceutical jurisprudence, including state and federal laws and ethical issues concerned with the practice of pharmacy. Prereq: PHRM 353 and PHRM 452L all with a grade of C or higher.

PHRM 575. Pharmacy Practice Management. 3 Credits.
This course introduces students to management techniques applicable to the contemporary practice of pharmacy in community and institutional settings. Prereq: PHRM 353 and PHRM 452L both completed with a grade of C or higher.

PHRM 576. Essentials for Pharmacist Licensure I. 1 Credit.
Part 1 of a comprehensive self-directed plan designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum in preparation for national pharmacist licensing examinations. Registration by permit only. Prereq: PHRM 500, PHRM 520, PHRM 540, PHRM 545L, PHRM 552L, PHRM 560, PHRM 570, PHRM 572, PHRM 575, PHRM 580 all with a grade C or higher.

PHRM 577. Essentials for Pharmacist Licensure II. 2 Credits.
Part 2 of a comprehensive self-directed plan designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum in preparation for national pharmacist licensing examinations. Enrollment is by permission only. Prereq: PHRM 576.

PHRM 578. Essentials for Pharmacist Licensure III. 2 Credits.
Part 3 of a comprehensive self-directed plan designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum in preparation for national pharmacist licensing examinations. Enrollment by permit only. Prereq: PHRM 577.

PHRM 580. Pharmacotherapy Capstone. 3 Credits.
Using clinical practice guidelines, current scientific literature, and pharmacotherapy concepts, students will evaluate integrated patient case scenarios. Prereqs: A grade of C or higher in PHRM 532, PHRM 534, PHRM 536, PHRM 537, PHRM 538, and PHRM 545L.

PHRM 581. Advanced Pharmacy Practice Experience - Rotation I. 5 Credits.
Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes and values developed through the other components of the curriculum. Enrollment by departmental permission only.

PHRM 582. Advanced Pharmacy Practice Experience - Rotation II. 5 Credits.
Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes and values developed through the other components of the curriculum.

PHRM 583. Advanced Pharmacy Practice Experience - Rotation III. 1-5 Credits.
Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes and values developed through the other components of the curriculum. Restrictions: Department permission required.

PHRM 584. Advanced Pharmacy Practice Experience - Rotation 4. 5 Credits.
Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum. Prereq: Successful completion of third professional year. Restrictions: Department permission required.

PHRM 585. Advanced Pharmacy Practice Experience - Rotation 5. 5 Credits.
Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum. Prereq: Successful completion of third professional year. Restrictions: Department permission required.

PHRM 586. Advanced Pharmacy Practice Experience - Rotation 6. 5 Credits.
Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum. Prereq: Successful completion of third professional year. Restrictions: Department permission required.

PHRM 587. Advanced Pharmacy Practice Experience - Rotation 7. 5 Credits.
Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum. Prereq: Successful completion of third professional year. Restrictions: Department permission required.

PHRM 588. Advanced Pharmacy Practice Experience - Rotation 8. 5 Credits.
Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum. Prereq: Successful completion of third professional year. Restrictions: Department permission required.

PHRM 589. Advanced Pharmacy Practice Experience - Rotation 9. 5 Credits.
Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum. Prereq: Successful completion of third professional year. Restrictions:Department permission required.

PHRM 590. Graduate Seminar. 1-3 Credits.

PHRM 593. Individual Study/Tutorial. 1-5 Credits.

PHRM 595. Field Experience. 1-15 Credits.

PHRM 596. Special Topics. 1-5 Credits.

PHRM 620. Special Populations. 3 Credits.
Focused on providing pharmaceutical care for a variety of populations including men, women, pediatric and geriatric patients. Prereq: PHRM 532, PHRM 537 and PHRM 538, all with a grade of C or better. {Also available for professional credit - See PHRM 520.}.

PHRM 625. Instructional Design for Health Professionals. 2 Credits.
Build basic skills to design and implement effective instructional activities ranging from pharmacy-specific professional education (e.g. patient education, inter-professional medication-related presentations) to college-level instructional tasks. {Also offered for undergraduate credit - see PHRM 425.}.

PHRM 632. Infectious Disease. 3 Credits.
This course is a clinical, patient-oriented approach to infectious disease. The instructors will review antimicrobial agents combined with specific infectious disease processes and therapies to help the students make appropriate judgments on infectious disease problems. Prereq: MICR 470, PSCI 412 both with a grade of C or higher. {Also offered for professional credit - see PHRM 532.}.

PHRM 638. PTDI: Cardiovascular and Pulmonary Diseases. 4 Credits.
Pharmacotherapy of cardiovascular and pulmonary diseases. Study of the pathophysiology, clinical presentation, and treatment of various cardiovascular and pulmonary diseases.

PHRM 640. 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. {Also offered for professional credit - see PHRM 540.}.

PHRM 653. Complementary and Alternative Therapies: An Evidence-Based Approach. 2 Credits.
This course is designed to provide health professions students with an overview of each form of complementary and alternative medicine (CAM) commonly practiced in the United States. Students will develop knowledge, skills, and practical tools necessary to understand and evaluate CAM, and provide recommendations for appropriate use to patients or other health care professionals. While specific products will be discussed when appropriate, the emphasis is on broad systems of treatment. Prereq or Coreq: Enrollment in MPH program or instructor permission. Dual-listing: PHRM 453.

PHRM 654. Scientific Writing for Health Professionals. 2 Credits.
Explores skills and concepts for communicating with scientific, patient, and public audiences with an emphasis on audience and context analysis. Students will choose projects that advance their professional goals. Dual-listing: PHRM 454.

PHRM 670. Pharmacy Practice Improvement and Project Management. 2 Credits.
Students will gain a basic understanding of pharmacy practice improvement and projects they may be expected to complete on a rotation or as a new practitioner. {Also offered for professional credit - see PHRM 570.}.

PHRM 675. Pharmacy Management. 3 Credits.
This course introduces students to management techniques applicable to the contemporary practice of pharmacy in community and institutional settings.

PHRM 696. Special Topics. 1-5 Credits.

PHRM 795. Field Experience. 1-15 Credits.

Philosophy (PHIL)

PHIL 101. Introduction to Philosophy. 3 Credits.
Basic problems, concepts, and methods of philosophy.

PHIL 111. Professional Responsibility and Ethics. 3 Credits.
The ethical responsibilities of professionals are examined in light of the major ethical theories, such as Utilitarianism, Kantianism, and Relativism.

PHIL 157. Critical Thinking and Informal Logic. 3 Credits.
Through applied informal logic, students are introduced the elements of reasoning, universal intellectual standards, and intellectual traits through readings, discussions, and practical application activities. By examining evidence and arguments, each student consciously develops the critical thinking concepts, skills, and strategies in learning he or she uses every day.

PHIL 194. Individual Study. 1-5 Credits.

PHIL 196. Field Experience. 1-15 Credits.

PHIL 199. Special Topics. 1-5 Credits.

PHIL 210. Ethics. 3 Credits.
Overview of different types of approaches to ethical dilemmas such as theistic ethics, naturalistic ethics, and situational ethics. Covers the ethical issues confronted in personal, public, and professional life.

PHIL 215. Contemporary Moral Issues. 3 Credits.
Many contemporary moral issues, such as the developed world's duties to the developing world, war, ethical technology, and gender issues are examined in light of the major ethical theories, such as Utilitarianism, Kantianism, and Relativism.

PHIL 216. Business Ethics. 3 Credits.
Many of the central moral issues of business, such as consumer rights, advertising, employee rights, and business competition, are examined in light of the major ethical theories, such as Utilitarianism, Kantianism, and Relativism.

PHIL 221. Indian Philosophical Tradition. 3 Credits.
An introduction to the philosophical tradition of the Indian Subcontinent. The course focuses on the major orthodox (astika) schools of Vedic philosophy, Samkhya, Nyaya, Vaisesika, Mimamsa, Vedanta, and Yoga, while also discussing the heterodox (nastika) Buddhist, Jain, and Materialist (Carvaka) schools. The course will present the major figures, teachings, and arguments of these schools with a special focus on their metaphysical and ethical views.

PHIL 225. Environmental Ethics. 3 Credits.
An investigation of ethics and the environment, including but not limited to ecofeminism, economics as environmental policy, and deep ecology.

PHIL 257. Traditional Logic. 3 Credits.
Study of the art and science of critical thinking; scientific method emphasized.

PHIL 291. Seminar. 1-5 Credits.

PHIL 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHIL 294. Individual Study. 1-5 Credits.

PHIL 299. Special Topics. 1-5 Credits.

PHIL 321. Ancient Philosophy. 3 Credits.
Greco-Roman philosophy from pre-Socratics to the Stoics and Epicureans.

PHIL 322. Medieval Philosophy. 3 Credits.
Western philosophy from St. Augustine to Ockham and Marsilius of Padua.

PHIL 323. Modern Philosophy. 3 Credits.
Western philosophy from Descartes to Kant.

PHIL 324. Contemporary Philosophy. 3 Credits.
An overview of the main philosophical thinkers and positions in the contemporary period.

PHIL 327. Ethics, Engineering, and Technology. 3 Credits.
Students will learn a unique and systematic approach to deal with the ethical issues that are increasingly inherent in technology and engineering practice. Using human morality, this course will examine the emergence of advanced technological systems and how they affect our individual and social behaviors, and in return, how they are affected by those behaviors and our shared and individual morality. Students will examine a broad range of ethical topics in design, sustainability and emerging technologies, professional codes of ethics and case studies. Cross-listed with ENGR 327.

PHIL 352. Knowledge and Reality. 3 Credits.
An extensive overview of the philosophical analysis of knowledge, reality, and associated concepts. In technical terminology, this is the study of Epistemology and Metaphysics.

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 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PHIL 391. Seminar. 1-3 Credits.

PHIL 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHIL 394. Individual Study. 1-5 Credits.

PHIL 399. Special Topics. 1-5 Credits.

PHIL 450. Metaphysics. 3 Credits.
Historical and systematic philosophical study of fundamental principles of reality, especially as concerns the human person.

PHIL 451. Skepticism and the Possibility of Knowledge. 3 Credits.
A detailed study of the philosophical analyses of skepticism, the nature and possibility of knowledge, and associated concepts. Prereq: PHIL 257.

PHIL 470. Social and Political Philosophy. 3 Credits.
An overview of the key social and political philosophical theories in the western tradition.

PHIL 475. Philosophy of Law. 3 Credits.
Philosophy of law examines the nature of law and law's relationship to other systems of norms, especially ethics and political philosophy. It asks questions such as "What is the basis of law?", "How should laws be interpreted?", "What is the relationship between law and morality?", and "What is justice?".

PHIL 486. Philosophy & Literature. 3 Credits.
Philosophical elements of selected works from Western literature, such as those of Dante, More, Milton, and Newman. Prereq: PHIL 101.

PHIL 487. Aesthetics. 3 Credits.
Principles of aesthetics as revealed by artists, writers, and philosophers.

PHIL 491. Seminar. 1-5 Credits.

PHIL 491H. Seminar. 3 Credits.

PHIL 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHIL 494. Individual Study. 1-5 Credits.

PHIL 496. Field Experience. 1-15 Credits.

PHIL 499. Special Topics. 1-5 Credits.

PHIL 625. Environmental Ethics. 3 Credits.
An investigation of ethics and the environment, including but not limited to ecofeminism, economics as environmental policy, and deep ecology. {Also offered for undergraduate credit - see PHIL 425.}.

PHIL 899. Doctoral Dissertation. 1-15 Credits.

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 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. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHYS 294. Individual Study. 1-5 Credits.

PHYS 299. Special Topics. 1-5 Credits.

PHYS 303. The Science of Learning. 1 Credit.
This course is designed for students serving as Learning Assistants in the College of Science and Mathematics and who are interested in the science behind learning in the STEM disciplines.

PHYS 350. Modern Physics. 3 Credits.
Breakdown of classical physics, special relativity, Bohr model, Schrodinger mechanics of simple systems, atomic structure, selected topics from nuclear and solid state physics. Prereq: PHYS 252, coreq of MATH 259 or MATH 265.

PHYS 355. Classical Mechanics. 3 Credits.
Basic concepts, single and coupled oscillators, variational calculus, Lagrangian and Hamiltonian dynamics, central force motion, accelerated coordinate systems. Prereq: PHYS 252 and MATH 265. Co-req: MATH 266.

PHYS 360. Modern Physics II. 3 Credits.
Continuation of modern physics covering molecular structure, nuclear physics and solid state physics with an embedded modern physics laboratory with experiments such as atomic and molecular spectroscopy, electron diffraction, nuclear spectroscopy, photoelectric effect and computer simulations of experiments. Prereq: PHYS 350.

PHYS 361. Electromagnetic Theory. 3 Credits.
Electrostatics, magnetostatics, dielectrics, electric circuits, time varying electric and magnetic fields, electromagnetic induction, and application of Maxwell's equations. Prereq: PHYS 252, MATH 266.

PHYS 370. Introduction to Computational Physics. 3 Credits.
Introduction to computational methods, with applications to planetary motion, numerical integration, chaotic oscillations, percolation, random walks, diffusion limited aggregation, molecular dynamics simulation, Monte Carlo methods, and Fourier transforms. 2 lectures, 2 one-hour laboratories. Prereq: PHYS 251, MATH 166 and CSCI 160 or ECE 173. Coreq: PHYS 252.

PHYS 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PHYS 391. Seminar. 1-3 Credits.

PHYS 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHYS 394. Individual Study. 1-5 Credits.

PHYS 397. Fe/Coop/Internship. 1-4 Credits.

PHYS 399. Special Topics. 1-5 Credits.

PHYS 411. Optics for Scientists & Engineers. 3 Credits.
Introduction to modern optics. Geometric optics, electromagnetic nature of light, polarization, interference, diffraction, fiber optics. Corequisite laboratory with major related optics project. Prereq: PHYS 252. Coreq: PHYS 411L. Cross-listed with ECE 411. {Also offered for graduate credit - see PHYS 611.}.

PHYS 411L. Optics for Scientists and Engineers Lab. 1 Credit.
Required laboratory for PHYS 411 or ECE 411. Ten optics experiments plus a major related optics project. Preq: PHYS 252. Coreq: PHYS 411. Cross-listed with ECE 411L. {Also offered for graduate credit - see PHYS 611L.}.

PHYS 413. Lasers for Scientists and Engineers. 3 Credits.
Lecture and laboratory introduction to lasers. Spontaneous and stimulated transitions, line-broadening, gain, gain saturation, optical resonators, Fabry-Perot interferometers, theory of laser oscillation, rate equations, transverse modes, coherence, and Gaussian beams. Prereq: PHYS 252. Cross-listed with ECE 413. {Also offered for graduate credit - see PHYS 613.}.

PHYS 415. Elements of Photonics. 3 Credits.
Analysis of optical systems using the matrix formulation, wave propagation in anisotropic media, electro-optic effect and laser modulation, physical origin of optical non-linearities, phase matching, optical second harmonic and parametric generation. Prereq: PHYS 252. Cross-listed with ECE 415. {Also offered for graduate credit - see PHYS 615.}.

PHYS 417. Optical Signal Transmission. 3 Credits.
Optical signal transmission including geometric optics and modal analysis for homogeneous and inhomogeneous light guides. Systems studies including coupling, inter-symbol interference, sources, photodetectors, and modulation. Prereq: ECE 351. Cross-listed with ECE 417. {Also offered for graduate credit - See PHYS 617.}.

PHYS 430. Quantum Computation. 3 Credits.
Students will master the foundations of quantum computation and quantum information, including underlying physical concepts and practical applications. Topics covered include Quantum Bits (Qubits), Single and Multiple Qubit Gates, Quantum Circuits, Quantum Computation, Quantum Algorithms, and Quantum Computers. Graduate students enrolled will also to gain experience with programming and executing the standard quantum algorithms, such as Fourier Transform, Grover's, Shor's Algorithms using, e.g., IBM Quantum Experience platform. Prereq: PHYS 252. Cross-listed with CSCI 430. Dual-listing: PHYS 630.

PHYS 462. Thermal and Statistical Physics. 3 Credits.
Classical postulates and laws of thermodynamics; cyclic processes and entropy; thermodynamic potentials, equilibrium, stability, and phase transitions; Maxwell-Boltzmann distribution, applications to classical gases and magnets; quantum statistics, Bose-Einstein and Fermi-Dirac distributions, applications to quantum gases. Prereq: PHYS 350. {Also offered for graduate credit - see PHYS 662.}.

PHYS 481. Materials Physics. 3 Credits.
Introduction to the physics of soft condensed matter, composed of polymers, colloids, amphiphiles, and liquid crystals, and of hard condensed matter, including metals, semiconductors, and superconductors, emphasizing phase transitions and materials properties (electrical, magnetic, optical, elastic). Pre-req: PHYS 252. {Also offered for graduate credit - see PHYS 681.}.

PHYS 485. Quantum Mechanics I. 3 Credits.
Operators, one-dimensional wells and barriers, Schroedinger equation, uncertainty, duality, Born interpretation, unstable states, bosons and fermions, central force problems, angular momentum, spin. Prereq: PHYS 350, MATH 266. {Also offered for graduate credit - see PHYS 685.}.

PHYS 486. Quantum Mechanics II. 3 Credits.
Continuation of PHYS 485. Perturbation theory, angular momentum addition, variational schemes, WKB method, scattering theory, time dependent problems. Prereq: PHYS 485. {Also offered for graduate credit - see PHYS 686.}.

PHYS 488. Senior Project I. 1 Credit.
This is the first course of the capstone experience in physics. It results in the proposal of an undergraduate research project that is carried out in the second capstone course. Pass/Fail only. Department consent required.

PHYS 489. Senior Project II. 2 Credits.
This is the second course of the capstone experience in physics. The student carries out the research project proposed in the first capstone course. Prereq: PHYS 488.

PHYS 491. Seminar. 1-5 Credits.

PHYS 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHYS 494. Individual Study. 1-5 Credits.

PHYS 496. Field Experience. 1-15 Credits.

PHYS 499. Special Topics. 1-5 Credits.

PHYS 611. Optics for Scientists & Engineers. 3 Credits.
Introduction to modern optics. Geometric optics, electromagnetic nature of light, polarization, interference, diffraction, fiber optics. Corequisite laboratory with major related optics project. Coreq: PHYS 611L. Cross-listed with ECE 611. {Also offered for undergraduate credit - see PHYS 411.}.

PHYS 611L. Optics for Scientists and Engineers Lab. 1 Credit.
Required laboratory for PHYS 611 or ECE 611. Ten optics experiments plus a major related optics project. Coreq: PHYS 611. Cross-listed with ECE 611L. {Also offered for undergraduate credit - see PHYS 411L.}.

PHYS 613. Lasers for Scientists and Engineers. 3 Credits.
Lecture and laboratory introduction to lasers. Spontaneous and stimulated transitions, line-broadening, gain, gain saturation, optical resonators, Fabry-Perot interferometers, theory of laser oscillation, rate equations, transverse modes, coherence, and Gaussian beams. Cross-listed with ECE 613. {Also offered for undergraduate credit - see PHYS 413.}.

PHYS 615. Elements of Photonics. 3 Credits.
Analysis of optical systems using the matrix formulation, wave propagation in anisotropic media, electro-optic effect and laser modulation, physical origin of optical non-linearities, phase matching, optical second harmonic and parametric generation. Cross-listed with ECE 615. {Also offered for undergraduate credit - see PHYS 415.}.

PHYS 617. Optical Signal Transmission. 3 Credits.
Optical signal transmission including geometric optics and modal analysis for homogeneous and inhomogeneous light guides. Systems studies including coupling, inter-symbol interference, sources, photodetectors, and modulation. Cross-listed with ECE 617. {Also offered for undergraduate credit - See PHYS 417.}.

PHYS 630. Quantum Computation. 3 Credits.
Students will master the foundations of quantum computation and quantum information, including underlying physical concepts and practical applications. Topics covered include Quantum Bits (Qubits), Single and Multiple Qubit Gates, Quantum Circuits, Quantum Computation, Quantum Algorithms, and Quantum Computers. Graduate students enrolled will also to gain experience with programming and executing the standard quantum algorithms, such as Fourier Transform, Grover's, Shor's Algorithms using, e.g., IBM Quantum Experience platform. Cross-listed with CSCI 630. Dual-listing: PHYS 430.

PHYS 662. Thermal and Statistical Physics. 3 Credits.
Classical postulates and laws of thermodynamics; cyclic processes and entropy; thermodynamic potentials, equilibrium, stability, and phase transitions; Maxwell-Boltzmann distribution, applications to classical gases and magnets; quantum statistics, Bose-Einstein and Fermi-Dirac distributions, applications to quantum gases. {Also offered for undergraduate credit - see PHYS 462.}.

PHYS 681. Materials Physics. 3 Credits.
Introduction to the physics of soft condensed matter, composed of polymers, colloids, amphiphiles, and liquid crystals, and of hard condensed matter, including metals, semiconductors, and superconductors, emphasizing phase transitions and materials properties (electrical, magnetic, optical, elastic). Dual-listing: PHYS 481.

PHYS 685. Quantum Mechanics I. 3 Credits.
Operators, one-dimensional wells and barriers, Schroedinger 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.
Schroedinger equation, wave packets, uncertainty, angular momentum, spin, second quantization, harmonic oscillator, resistance mechanisms.

PHYS 772. Quantum Physics II. 3 Credits.
Schroedinger equation, wave packets, uncertainty, angular momentum, spin, second quantization, harmonic oscillator, resistance mechanisms. Prereq: PHYS 771.

PHYS 781. Solid State Physics. 3 Credits.
Crystal structure and binding, reciprocal lattices and x-ray diffraction, lattice vibrations, thermal properties, free electron model, band theory, magnetism, superconductivity. Prereq: PHYS 685.

PHYS 782. Condensed Matter Physics. 3 Credits.
An introduction to soft condensed matter, focusing on colloids, polymers, liquid crystals, surfactants, and biological systems. Topics will include characterization of soft materials, interparticle interactions, structure, equilibrium phase behavior, non-equilibrium properties, and practical applications. Prereq: PHYS 663.

PHYS 790. Graduate Seminar. 1-3 Credits.

PHYS 791. Temporary/Trial Topics. 1-5 Credits.

PHYS 793. Individual Study/Tutorial. 1-5 Credits.

PHYS 794. Practicum. 1-10 Credits.

PHYS 796. Special Topics. 1-5 Credits.

PHYS 797. Master's Paper. 1-3 Credits.

PHYS 798. Master's Thesis. 1-10 Credits.

PHYS 899. Doctoral Dissertation. 1-15 Credits.

Plant Pathology (PPTH)

PPTH 194. Individual Study. 1-5 Credits.

PPTH 196. Field Experience. 1-15 Credits.

PPTH 199. Special Topics. 1-5 Credits.

PPTH 291. Seminar. 1-5 Credits.

PPTH 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PPTH 294. Individual Study. 1-5 Credits.

PPTH 299. Special Topics. 1-5 Credits.

PPTH 324. Introductory Plant Pathology. 3 Credits.
Etiology, symptomatology and control of representative plant diseases and demonstrations. 2 lectures, 1 laboratory. F.

PPTH 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PPTH 391. Seminar. 1-5 Credits.

PPTH 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PPTH 394. Individual Study. 1-5 Credits.

PPTH 399. Special Topics. 1-5 Credits.

PPTH 454. Diseases Of Field and Forage Crops. 3 Credits.
Etiology, symptomology, control, and importance of field and forage crop diseases. 2 lectures, 1 laboratory. Prereq: PPTH 324. S (even years) {Also offered for graduate credit - see PPTH 654.}.

PPTH 455. Plant Disease Management. 3 Credits.
Diagnosis and control of horticultural crop diseases. 2 lectures, 1 laboratory. Prereq: PPTH 324. S (odd years) {Also offered for graduate credit - see PPTH 655.}.

PPTH 457. Landscape Plant Pathology. 3 Credits.
Tree and turfgrass pathology with emphasis on disease identification and management strategies for a variety of settings. Two lectures and a 2-hour lab. Prereq: PPTH 324. S (odd years). {offered at the graduate level as PPTH 657}.

PPTH 460. Fungal Biology. 3 Credits.
Fungal ecology, morphology, genetics, physiology, taxonomy, and relevance to humans. 2 lectures, 1 laboratory. Prereq: BIOL 150, PPTH 324. F (even years) {Also offered for graduate credit - see PPTH 660.}.

PPTH 491. Seminar. 1-5 Credits.

PPTH 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PPTH 494. Individual Study. 1-5 Credits.

PPTH 496. Field Experience. 1-15 Credits.

PPTH 499. Special Topics. 1-5 Credits.

PPTH 654. Diseases Of Field and Forage Crops. 3 Credits.
Etiology, 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. 3 Credits.
The course will provide an understanding of fungicides, their mode of action, the development of resistance, and resistance management strategies.

PPTH 757. Advanced Techniques in Plant Pathology. 3 Credits.
Review of traditional and latest tools and techniques available to conduct research in plant pathology. Two lectures.

PPTH 758. Bacterial, Nematode and Viral Diseases of Plants. 4 Credits.
Biology, epidemiology, and management of plant diseases caused by bacteria, nematodes and viruses.

PPTH 759. Host-Parasite Genetics. 3 Credits.
Host-parasite genetics including genetics of plant and pathogens and gene-for-gene relationships. 3 lectures. S (even years).

PPTH 760. Fungal Genetics. 4 Credits.
Biology and genetics of fungi. Emphasis on genes, genomes, and genetic control of growth and development, physiology, and etiology of fungi. 2 lectures, 2 laboratories. F (odd years).

PPTH 767. Effectoromics. 3 Credits.
Introduction and evolution of microbe effector research from changes in immune response models to modern effector identification techniques.

PPTH 790. Graduate Seminar. 1-3 Credits.

PPTH 791. Temporary/Trial Topics. 1-5 Credits.

PPTH 792. Graduate Teaching Experience. 1-6 Credits.

PPTH 793. Individual Study/Tutorial. 1-5 Credits.

PPTH 794. Practicum/Internship. 1-10 Credits.

PPTH 795. Field Experience. 1-15 Credits.

PPTH 796. Special Topics. 1-5 Credits.

PPTH 797. Master's Paper. 1-3 Credits.

PPTH 798. Master's Thesis. 1-10 Credits.

PPTH 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

PPTH 899. Doctoral Dissertation. 1-15 Credits.

Plant Sciences (PLSC)

PLSC 110. World Food Crops. 3 Credits.
Scientific principles of crop growth, worldwide production, management alternatives, and processing for domestic and international consumption. 2 lectures, 1 discussion, 1 tutorial laboratory. F, S.

PLSC 111. Genetics and You. 2 Credits.
Basic concepts in genetics with emphasis on current human genetics. 2 lectures.

PLSC 150. Introduction to Horticulture Therapy. 3 Credits.
Horticultural therapy involves the use of plants and gardening activities to facilitate mental and physical rehabilitation. Students will become familiar with facilitation techniques, programs, clients, staff, budgets, facilities, equipment, and the various populations that horticulture therapists serve. 2 lectures and 2 lab hours per week.

PLSC 177. Floral Design I. 2 Credits.
History of floral design, care, handling, and identification of fresh cut flowers and dried materials. Use of tools, equipment, and supplies used in the industry and application of basic design styles, holiday designs, and displays. 1 lecture, 1 two-hour laboratory. S.

PLSC 180. Plant Systems Approach to Global Foods. 3 Credits.
This course will focus on fundamental "Plant Systems" concepts and associated metabolic rationale to understand Global Food Systems from agro-ecological foundations. These plant systems concepts, from diverse geographical origins, will be linked to food processing principles and public health relevance as the basis for advancing global food security. Overall the course will advance integrated and systems-based understanding of global challenges to agriculture and food security driven by food crops. 3 lectures.

PLSC 189. Skills for Academic Success. 1 Credit.

PLSC 194. Individual Study. 1-5 Credits.

PLSC 196. Field Experience. 1-15 Credits.

PLSC 199. Special Topics. 1-5 Credits.

PLSC 200. Career Preparation in Plant Sciences. 2 Credits.
Develop techniques to prepare for successful employment, identify and use resources to search for employment opportunities. Develop effective written and oral communication skills and gain exposure to several avenues of employment and career paths.

PLSC 210. Horticulture Science. 3 Credits.
Principles of plant classification, structure, function, growth, propagation, culture, and use of horticultural crops. Covers vegetable and fruit production in the home garden, growing flowers and planting flower beds, and landscaping principles and materials. 3 lectures. F.

PLSC 211. Horticulture Science Lab. 1 Credit.
Exercises in plant identification, propagation, nutrition, gardening, greenhouses, lawn care, landscape design, interior plants, pruning, and culture of horticultural crops. 1 two-hour laboratory. F.

PLSC 215. Weed Identification. 1 Credit.
Identification of weed seeds and plants from seedling to mature stages. Emphasis on life cycles, common distribution, and family groupings. 1 one and one half-hour laboratory plus time by arrangement. F.

PLSC 219. Introduction to Prairie & Community Forestry. 2 Credits.
Urban and traditional forestry as applied to the Great Plains region, as well as global forests. History, opportunities, and basic interactions of forestry with wildlife, parks and recreation, horticulture, and the ecology of the planet. 2 lectures. F (odd years).

PLSC 225. Principles of Crop Production. 3 Credits.
Principles of field crop production with emphasis on relationships of crops to their climate and production considerations as a means of managing resources and environmental factors. 2 lectures, 1 two-hour laboratory. Prereq: PLSC 110. S.

PLSC 291. Seminar. 1-5 Credits.

PLSC 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PLSC 294. Individual Study. 1-5 Credits.

PLSC 296. Field Experience. 1-15 Credits.

PLSC 299. Special Topics. 1-5 Credits.

PLSC 307. History and Evolution of Wine in America. 1 Credit.
Introduction to wines and wine industries from a historical perspective. Include an overview of cultivar selection, cultivation, harvesting, expressing, fermenting, and processing wines for unique characteristics. Wine tasting is needed to link sensory perceptions to wine characteristics. 1 lecture. Students must be at least 21 years old. F.

PLSC 312. Expanding the Boundaries of Learning with Service. 1 Credit.
This course is designed to build on the speaking, writing, interpersonal and team skills, and citizenship of our students. This course uses a service learning approach and can be repeated for credit. S.

PLSC 315. Genetics. 3 Credits.
Study of the basis of heredity with emphasis on structure and function of DNA and Mendelian genetics. 3 lectures. Cross-listed with BIOL 315. F, S.

PLSC 315L. Genetics Laboratory. 1 Credit.
Study of the basis of heredity with emphasis on structure and function of DNA and Mendelian genetics. 1 two-hour laboratory. Cross-listed with BIOL 315L. F, S.

PLSC 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 355. Woody Landscape Plants. 3 Credits.
Nomenclature, identification, and landscape characteristics of native and introduced deciduous and evergreen woody plants commonly used in the Northern Plains. Field trips. 1 lecture, 2 two-hour laboratories. Recommended Coreq: BIOL 150 or BIOL 151, PLSC 210. F.

PLSC 365. Herbaceous Landscape Plants. 2 Credits.
Production, identification, and uses of annual, perennial, and bulbous ornamentals in home and public landscapes with consideration to insect and disease problems. 3 one-hour lecture/laboratories. Recommended Coreq: PLSC 210. F (odd years).

PLSC 368. Plant Propagation. 3 Credits.
Principles and practices of seed propagation and of asexual propagation: cuttings, layering division, specialized structures, grafting, budding, and micropropagation. 2 lectures, 1 two-hour laboratory. Recommended Coreq: BIOL 150 or BIOL 151, PLSC 210. S.

PLSC 370. Landscape Management. 3 Credits.
Introduction to basic landscape management principles and practices. Commercial management practices associated with the landscape design/build and maintenance industry are emphasized. F (odd years).

PLSC 375. Turfgrass Management. 3 Credits.
Species characteristics of cool and warm season turfgrasses, including cultural requirements for home lawns, parks, and sports turf. 3 lectures. Coreq: BIOL 150 or BIOL 151, PLSC 110 or PLSC 210.

PLSC 375L. Turfgrass Management Laboratory. 1 Credit.
This lab will provide students an opportunity to gain hands-on experience in turf-related topics discussed in the turfgrass management class. 1 two-hour laboratory. Co-req: PLSC 375.

PLSC 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PLSC 380. Principles of Plant Physiology. 3 Credits.
Study of plant physiological principles, including photosynthesis, respiration, water and nutrient uptake, plant growth and development, and stress responses, and the relationships between plant physiology and agricultural cultural practice. 3 lectures. Prereq: BIOL 150 or PLSC 210.

PLSC 381. Sports Turf Operations. 3 Credits.
Strategic management practices in sports turf and golf course operations, including development of cultural practices adhering to environmental regulations, personnel management, and budgeting. 3 lectures. Prereq: PLSC 375. F.

PLSC 386. Arboriculture Climbing and Rigging Operations. 2 Credits.
Introduction to the basics of tree climbing and rigging focusing on tree hazard assessment, climbing line placement, ascending, descending and moving around in the canopy as well as methods of safely rigging down branches and trunk sections of trees.

PLSC 391. Seminar. 1-5 Credits.

PLSC 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PLSC 394. Individual Study. 1-5 Credits.

PLSC 397. Cooperative Education. 1-4 Credits.

PLSC 399. Special Topics. 1-5 Credits.

PLSC 411. Genomics. 3 Credits.
An integrated presentation of genome organization, genome sequencing and characterization, comparative genomics, transcriptomics, proteomics, and metabolomics. Recommended Prereq: BIOL 150, STAT 330. F {Also offered for graduate credit - see PLSC 611.}.

PLSC 412. Nursery Production and Management. 3 Credits.
Industry overview, production-management practices, facilities, equipment, nursery stock standards, storage, and over wintering. Field trips. 3 lectures. Coreq: PLSC 368. S (odd years).

PLSC 415. Vegetable Crop Production. 2 Credits.
Vegetable Crop Production explores the history, classification, culture, physiological principles, post-harvest handling, and marketing of major vegetable crops. 2 lectures. Recommended Prereq: BIOL 150 or BIOL 151; PLSC 210 and PLSC 211. S (odd years). {Also offered for graduate credit - see PLSC 615}.

PLSC 416. Fruit Crop Production. 2 Credits.
Principles of tree fruit and small fruit production, emphasizing cool climate production. Plant establishment, pruning and training, harvesting and storage, and physiological, environmental, and cultural control of productivity, fruit quality, and pest damage. Recommended Prereq: BIOL 151, PLSC 210 and PLSC 211. F (even years). {Also offered for graduate credit - see PLSC 616}.

PLSC 420. Integrated Forage and Cover Crops Production Management and Ecosystem Services. 3 Credits.
Introduction to alfalfa and other forage crops and their management, identification, preservation, forage quality characteristics, use of legumes in rotations and their benefits to the environment. Prereq: PLSC 110. Dual-listing: PLSC 620.

PLSC 422. Greenhouse Production and Management. 3 Credits.
Overview of controlled environment agriculture, greenhouse structure and construction, glazing materials, benches and space utilization, heating and cooling, lighting, root substrates, fertilizing, hydroponics, growth regulators, pest control, crop programing, production cost and labor management, growing selected crops, and field trips. 2 lectures, 1 two-hour laboratory. Coreq: PLSC 368. {Also offered for graduate credit - see PLSC 622.}.

PLSC 425. Potato Science. 2 Credits.
History, botany, cultural practices, harvesting, breeding, physiology, storage, and processing of the potato. 2 lectures. Half semester long course beginning in October. Recommended Prereq: BIOL 150, BIOL 151, PLSC 110, and PLSC 210. F/2 (odd years) {Also offered for graduate credit - see PLSC 625}.

PLSC 431. Intermediate Genetics. 3 Credits.
Expansion of classical and molecular concepts of genetics; basic concepts of Mendelian, quantitative, population, molecular, and evolutionary genetics. 2 lectures. Prereq: PLSC 315. F {Also offered for graduate credit - see PLSC 631.}.

PLSC 433. Weed Biology and Ecology. 2 Credits.
Principles of weed biology and ecology including seed biology, phenotypic plasticity, seedbank dynamics, population and community structure and dynamics, interference, invasion biology, gene flow and evolution, biological control, and ecologically based weed management. Prereq: PLSC 380. S (even years).

PLSC 450. Sugarbeet Production. 2 Credits.
History, growth, and development; soil and fertility management; weeds, insect, and disease control; cultivars; harvesting, storage, and processing of sugarbeets. Dual-listing: PLSC 650.

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. 3 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. 3 lectures. S (even years) Prereq: PLSC 355. {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.

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.

PLSC 480. Advanced Turfgrass Topics. 3 Credits.
Development of the turfgrass industry and the scientific basis of strategic turfgrass management, including relationships between turfgrasses, the environment, management and methodologies in turfgrass research. Prereq: PLSC 375. S (even years) {Also offered for graduate credit - see PLSC 680.}.

PLSC 484. Plant Tissue Culture and Biotechnology. 3 Credits.
Principles and techniques of plant tissue culture and genetic manipulation and their applications to plant improvement. Hands-on experience with plant tissue culture and genetic engineering. 2 lectures, 1 two-hour laboratory. Prereq: PLSC 315. F {Also offered for graduate credit - see PLSC 684.}.

PLSC 485. Arboriculture Science. 3 Credits.
Tree, shrub, and vine care based on the physiology of shoot and root growth and limitations of the environment. Includes plant and site selection, transplanting, staking, fertilizing, pruning, mulching, and related subjects. 3 lectures. Recommended Prereq: PLSC 355. F (even years) {Also offered for graduate credit - see PLSC 685.}.

PLSC 486. Applied Crop Physiology. 3 Credits.
Application of physiological principles on plant growth and development and crop production. 3 lectures. Prereq: PLSC 380. S (even) {Also offered for graduate credit - see PLSC 686.}.

PLSC 491. Seminar. 1-5 Credits.

PLSC 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PLSC 493. Undergraduate Research. 1-5 Credits.

PLSC 494. Individual Study. 1-5 Credits.

PLSC 496. Field Experience. 1-15 Credits.

PLSC 499. Special Topics. 1-5 Credits.

PLSC 611. Genomics. 3 Credits.
An integrated presentation of genome organization, genome sequencing and characterization, comparative genomics, transcriptomics, proteomics, and metabolomics. F {Also offered for undergraduate credit - see PLSC 411.}.

PLSC 612. Nursery Production and Management. 3 Credits.
Industry overview, production-management practices, facilities, equipment, nursery stock standards, storage, and over wintering. Field trips. 3 lectures. {Also offered for undergraduate credit - see PLSC 412}.

PLSC 615. Vegetable Crop Production. 2 Credits.
Vegetable Crop Production explores the history, classification, culture, physiological principles, post-harvest handling, and marketing of major vegetable crops. 2 lectures. S (odd years). {Also offered for undergraduate credit - see PLSC 415}.

PLSC 616. Fruit Crop Production. 2 Credits.
Principles of tree fruit and small fruit production, emphasizing cool climate production. Plant establishment, pruning and training, harvesting and storage, and physiological, environmental, and cultural control of productivity, fruit quality, and pest damage. F (even years). {Also offered for undergraduate credit - see PLSC 416}.

PLSC 620. Integrated Forage and Cover Crops Production Management and Ecosystem Services. 3 Credits.
Introduction to alfalfa and other forage crops and their management, identification, preservation, forage quality characteristics, use of legumes in rotations and their benefits to the environment. Dual-listing: PLSC 420.

PLSC 622. Greenhouse Production and Management. 3 Credits.
Overview of controlled environment agriculture, greenhouse structure and construction, glazing materials, benches and space utilization, heating and cooling, lighting, root substrates, fertilizing, hydroponics, growth regulators, pest control, crop programing, production cost and labor management, growing selected crops, and field trips. 2 lectures, 1 two-hour laboratory. {Also offered for undergraduate credit - see PLSC 422.}.

PLSC 625. Potato Science. 2 Credits.
History, botany, cultural practices, harvesting, breeding, physiology, storage, and processing of the potato. 2 lectures. Half semester long course beginning in October. F/2 (odd years) {Also offered for undergraduate credit - see PLSC 425}.

PLSC 631. Intermediate Genetics. 3 Credits.
Expansion of classical and molecular concepts of genetics; basic concepts of Mendelian, quantitative, population, molecular, and evolutionary genetics. 2 lectures. F {Also offered for undergraduate credit - see PLSC 431.}.

PLSC 633. Weed Biology and Ecology. 2 Credits.
Principles of weed biology and ecology including seed biology, phenotypic plasticity, seedbank dynamics, population and community structure and dynamics, interference, invasion biology, gene flow and evolution, biological control, and ecologically based weed management. S (even years) {Also offered for undergraduate credit - see PLSC 433.}.

PLSC 650. Sugarbeet Production. 2 Credits.
History, growth, and development; soil, fertility, weed, insect, and disease management; cultivars; harvesting, storage, and processing of sugarbeet. Dual-listing: PLSC 450.

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. 3 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. 3 lectures. 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 (even) {Also offered for undergraduate credit - see PLSC 486.}.

PLSC 690. Graduate Seminar. 1-3 Credits.

PLSC 695. Field Experience. 1-15 Credits.

PLSC 696. Special Topics. 1-5 Credits.

PLSC 710. Professional Development I. 1 Credit.
This course introduces students to professional society structure and function, mechanics of data presentation, and written discussion. Assignments will emphasize skills needed to complete a research proposal and prepare a research presentation. F.

PLSC 711. Professional Development II. 1 Credit.
This course emphasizes manuscript preparation, manuscript review, poster development, and grantsmanship. Consideration of professional ethics underlies all topics. S.

PLSC 718. Genetics & Plant Improvement. 3 Credits.
Genetic principles and their application to plant improvement. Crop evolution, chromosome structure, and population dynamics related to crop improvement methodology. Genetically modified plants, their impact on breeding technique, and the release of improved varieties. 3 one-hour lectures. Prereq: PLSC 315 and PLSC 315L. F.

PLSC 721. Genomics Techniques. 2 Credits.
Principles, techniques, and applications of the large-scale analysis of DNA organization and sequence, RNA expression, protein sequence, and structure. Prereq: PLSC 611. S.

PLSC 724. Field Design I. 3 Credits.
Application of various field designs, factorial and split-plot arrangements, orthogonal and non-orthogonal comparisons, models, components of variance, correlation, and regression to biological problems. 3 lectures. Recommended Prereq: STAT 725. F.

PLSC 727. Crop Breeding Techniques. 1 Credit.
Evaluation and practice of breeding methods used to develop superior genotypes in crop species across public and private breeding programs. Understanding why certain breeding techniques are used for adaptation, genetic improvement, and cultivar development. Prereq: PLSC 718, PLSC 724. Recommended prereq: PLSC 710, PLSC 734. SS (odd years).

PLSC 731. Plant Molecular Genetics. 3 Credits.
Molecular aspects of plant genome organization and expression; basic and applied usages of molecular markers and gene transfer techniques. 3 lectures. Prereq: PLSC 631. S (even years).

PLSC 734. Field Design II. 2 Credits.
Application of incomplete block designs, confounding and covariance analyses to biological problems. 2 lectures. Prereq: PLSC 724. S (odd years).

PLSC 749. Applied Plant Molecular Breeding. 3 Credits.
This course provides principles and applications of genomics-assisted plant breeding such as germplasm characterization, molecular marker and gene discovery, marker-assisted selection, and genomic selection. Recommend: PLSC 611. F (odd years). Prereq: PLSC 718.

PLSC 750. Crop Stress Physiology. 3 Credits.
Application of physiological principles to enhancement of stress tolerance in crops. Background knowledge in plant physiology is needed. S (odd years).

PLSC 751. Advanced Plant Genetics. 3 Credits.
Advanced topics in plant genetics regarding the study of genetic linkage, marker-assisted selection, statistical analysis and interpretation of genetic data, and the study of the inheritance in autotetraploid species. 3 lectures. Prereq: PLSC 631. S (odd years).

PLSC 753. Action & Fate Of Herbicides. 2 Credits.
Herbicide mode of action and fate of herbicides in plants and soil, physiology of herbicide resistance, and herbicide antidotes. 2 lectures. Prereq: PLSC 653. S (even years).

PLSC 755. Advanced Crop Management Decision Making. 3 Credits.
Problem-based learning approach focusing on the scientific, professional, personal, and ethical issues associated with advanced crop management decision-making. Recommended Prereq: PLSC 655. F (even years).

PLSC 763. Laboratory Methods-Weed Science. 2 Credits.
Chemical, analytical, and physiological methods for determining pesticide residues in soil and ground water; and herbicide absorption, translocation, and metabolism in plants. 2 two-hour laboratories. Prereq: PLSC 653. S (odd years).

PLSC 776. Advanced Plant Breeding. 4 Credits.
Application of genetic principles to improvement of self- and cross-pollinated crops. 4 lectures. Prereq: PLSC 718, PLSC 724. S (odd years).

PLSC 779. Study Abroad: Sustainable Agriculture and Renewable Energies in Europe. 1-3 Credits.
This study abroad course covers the main aspects of sustainable agriculture and renewable energy production in Europe. SS.

PLSC 782. Population and Quantitative Genetics. 4 Credits.
Population and quantitative genetics theories and application to applied plant breeding. Prereq: PLSC 718 and PLSC 724.

PLSC 785. Crop Breeding Programs Management. 2 Credits.
Development of student ability to understand, examine, and evaluate crop breeding and improvement programs. Prereq: PLSC 718, PLSC 724. S (even years).

PLSC 790. Graduate Seminar. 1-3 Credits.

PLSC 791. Temporary/Trial Topics. 1-5 Credits.

PLSC 792. Graduate Teaching Experience. 1-6 Credits.

PLSC 793. Individual Study/Tutorial. 1-5 Credits.

PLSC 794. Practicum. 1-8 Credits.

PLSC 795. Field Experience. 1-15 Credits.

PLSC 796. Special Topics. 1-5 Credits.

PLSC 797. Master's Paper. 1-3 Credits.

PLSC 798. Master's Thesis. 1-10 Credits.

PLSC 892. Graduate Teaching Experience. 1-6 Credits.

PLSC 894. Practicum/Internship. 1-8 Credits.

PLSC 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

PLSC 899. Doctoral Dissertation. 1-15 Credits.

Political Science (POLS)

POLS 110. Introduction to Political Science. 3 Credits.
Problems of political science as a discipline, political systems, and political behavior. Includes causes and consequences of individual and group political behavior.

POLS 115. American Government. 3 Credits.
Principles of American government, political behavior, and institutions.

POLS 120. Terrorism. 3 Credits.
Examination of problems of terrorism. Includes its historical perspectives; terrorist motivations, organizations, tactics, strategies; role of media; government responses; future trends, prospects.

POLS 194. Individual Study. 1-5 Credits.

POLS 196. Field Experience. 1-15 Credits.

POLS 199. Special Topics. 1-5 Credits.

POLS 210. Current Politics. 3 Credits.
Study of current national and state political issues.

POLS 215. Problems and Policies In American Government. 3 Credits.
Study of the functioning of American government focusing on the policy process.

POLS 216. Campaigns and Elections. 3 Credits.
Examination of political campaigns and elections with special emphasis for voting behavior, history and theory of political advertising, and effectiveness/ethics of negative advertising. Prereq: POLS 115.

POLS 220. International Politics. 3 Credits.
Concepts, theories, and issues in international relations.

POLS 225. Comparative Politics. 3 Credits.
Comparative analysis of contemporary political systems, practices, institutions, and actors.

POLS 230. Judicial Process. 3 Credits.
Role of lawyers, judges, and courts in the political system. Special emphasis on judicial decision-making and the ideas behind law.

POLS 231. Law and Society. 3 Credits.
Examines the history, types, and sources of law, and the interaction between law, government, and society.

POLS 240. Political Ideologies. 3 Credits.
Study of ideas, belief systems, and basic principles of ideologies.

POLS 291. Seminar. 1-5 Credits.

POLS 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

POLS 294. Individual Study. 1-5 Credits.

POLS 299. Special Topics. 1-5 Credits.

POLS 315. Federal Law Enforcement and Crime Policy. 3 Credits.
Examination of the history, development, current make-up, and jurisdiction of federal law enforcement in the United States, as well as the role of the federal government in setting national crime policy and the strategies employed. Crpss-listed with CJ.

POLS 325. Applied Research Methods. 3 Credits.
This course provides an overview of the scientific model, the philosophy and goals of science, and a detailed study of qualitative and quantitative methodologies.

POLS 350. Gender Issues and the Law. 3 Credits.
This course examines gender differentiations reflected in the U.S. law from both the historical and contemporary perspectives and the impact of that differentiation, particularly on women, in the areas of employment, education and family law.

POLS 351. Women and Politics. 3 Credits.
Study of women leaders; their roles and perspectives within a national and international framework.

POLS 360. Principles of Public Administration. 3 Credits.
Empirical study of public administrators in their diverse roles and functions.

POLS 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

POLS 391. Seminar. 1-5 Credits.

POLS 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

POLS 394. Individual Study. 1-5 Credits.

POLS 397. Fe/Coop Ed/Internship. 1-15 Credits.

POLS 399. Special Topics. 1-5 Credits.

POLS 420. Political Behavior-Executive-Legislative Process. 3 Credits.
Behavioral study of executives and legislators with emphasis on examination of empirical data. {Also offered for graduate credit - see POLS 620.}.

POLS 421. Political Behavior-Political Parties. 3 Credits.
Behavioral study of political leaders with emphasis on examination of empirical data. Prereq: admission to the Political Science major. {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 major. {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. {Also offered for graduate credit - see POLS 623.}.

POLS 424. Inequality and Public Policy. 3 Credits.
Provides an overview of the relationship between public policy and contemporary patterns of inequality in the United States. Addresses the social, cultural, and political forces that shape inequality and policy making; policy incentives, trade-offs, and unintended consequences; the differential impact of policies; and paths forward. Policy areas of interest include social welfare, housing, healthcare, labor, crime, environment, and others. {Also offered for graduate credit - see POLS 624.}.

POLS 430. Constitutional Law-Civil Liberties. 3 Credits.
Examination of First Amendment rights including freedom of speech, press, religion, association, and assembly. Due process and equal protection concerns are also addressed. Prereq: at least junior standing {Also offered for graduate credit - see POLS 630.}.

POLS 431. Constitutional Law-Criminal Justice. 3 Credits.
Study of Fourth, Fifth, and Sixth Amendment rights. Emphasis on the law of arrest, search and seizure, self-incrimination, and right to counsel. {Also offered for graduate credit - see POLS 631.}.

POLS 432. Crime and Public Policy. 3 Credits.
Examines the legal, political, public welfare, and social bases and implications of public safety governance implemented by federal, state, and local courts and bureaucracies.

POLS 433. Law and Public Policy. 3 Credits.
Provides an overview of how law regulates the public policy activities of governmental institutions and how courts function as creators of public policy. Topics include judicial review, separation of powers, federalism, administrative law, and judicial policy impact/implementation. {Also offered for graduate credit - see POLS 633.}.

POLS 442. Global Policy Issues. 3 Credits.
Analysis of the impact of planetary limits to growth, increasing globalization of the world economy, and changing control over resource systems on global politics. {Also offered for graduate credit - see POLS 642.}.

POLS 444. International Law. 3 Credits.
Examines the history and foundation of the international legal system, including custom, treaties, jurisdiction, and the relationship between international and municipal law. {Also offered for graduate credit - see POLS 644.}.

POLS 445. Ethnic Conflicts. 3 Credits.
Explores numerous topics and cases related to ethnic conflicts, including the nature of ethnic identity, the causes of ethnic conflicts, and ethnic conflict prevention/resolution. {Also offered for graduate credit - see POLS 645.}.

POLS 446. International Criminal Law. 3 Credits.
Examines international criminal law. Topics will include war crimes, crimes against humanity, genocide, aggression, and other related issues. Dual-listing: POLS 646.

POLS 447. U.S. National Security Law. 3 Credits.
Examines the history and development of U.S. national security law, including separation powers, counterterrorism, and civil liberties.

POLS 450. Politics of the Developing Countries. 3 Credits.
Comparative examination of the government and politics of developing countries. Attention is given to special economic and cultural circumstances facing the political systems of these countries. {Also offered for graduate credit - see POLS 650.}.

POLS 451. Politics of the Industrialized Countries. 3 Credits.
Comparative study of government and politics in the industrialized countries including the analysis of legislative and executive branches, parties, bureaucracies, constitutions, policies, and voting behavior. {Also offered for graduate credit - see POLS 651.}.

POLS 452. Comparative Political Economy. 3 Credits.
Comparative study of the relationship between politics and the economy in industrialized and developing countries. Topics include elections, trade, development, investment, redistribution, and the political business cycle. {Also offered for graduate credit - see POLS 652.}.

POLS 453. Environmental Policy and Politics. 3 Credits.
Course is designed to provide students with both a general and advanced understanding of environmental issues. Will examine philosophical underpinnings informing environmental policy making as well as analyze various substantive environmental issues in US. {Also offered for graduate credit - see POLS 653.}.

POLS 454. Comparative Democratic Institutions. 3 Credits.
This course examines the emergence, evolution, and functioning of political institutions across democracies. Topics include party systems, presidential and parliamentary regimes, legislative organization, electoral systems, and bureaucratic structures. {Also offered for graduate credit - see POLS 654.}.

POLS 470. Quantitative Methods for Political Science and Public Policy. 3 Credits.
Introduction to social science data analysis with a focus on political science and public policy applications. Students will learn to describe and model social data and determine if patterns in those data are meaningful. Prereq: STAT 330 or POLS 325. Dual-listing: POLS 670.

POLS 489. Senior Seminar. 3 Credits.
Capstone experience. Emphasis on integrative skills needed to interrelate the concepts of the discipline.

POLS 491. Seminar. 1-5 Credits.

POLS 491H. Seminar. 1-3 Credits.

POLS 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

POLS 494. Individual Study. 1-5 Credits.

POLS 496. Field Experience. 1-15 Credits.

POLS 499. Special Topics. 1-5 Credits.

POLS 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 623. 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. {Also offered for undergraduate credit - see POLS 423.}.

POLS 624. Inequality and Public Policy. 3 Credits.
Provides an overview of the relationship between public policy and contemporary patterns of inequality in the United States. Addresses the social, cultural, and political forces that shape inequality and policy making; policy incentives, trade-offs, and unintended consequences; the differential impact of policies; and paths forward. Policy areas of interest include social welfare, housing, healthcare, labor, crime, environment, and others. {Also offered for undergraduate credit - see POLS 424.}.

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 633. Law and Public Policy. 3 Credits.
Provides an overview of how law regulates the public policy activities of governmental institutions and how courts function as creators of public policy. Topics include judicial review, separation of powers, federalism, administrative law, and judicial policy impact/implementation. {Also offered for undergraduate credit - see POLS 433.}.

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 646. International Criminal Law. 3 Credits.
Examines international criminal law. Topics will include war crimes, crimes against humanity, genocide, aggression, and other related issues. {Also offered for undergraduate credit - see POLS 446.}.

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 654. Comparative Democratic Institutions. 3 Credits.
This course examines the emergence, evolution, and functioning of political institutions across democracies. Topics include party systems, presidential and parliamentary regimes, legislative organization, electoral systems, and bureaucratic structures. {Also offered for undergraduate credit - see POLS 454.}.

POLS 670. Quantitative Methods for Political Science and Public Policy. 3 Credits.
Introduction to social science data analysis with a focus on political science and public policy applications. Students will learn to describe and model social data and determine if patterns in those data are meaningful. Prereq: STAT 725 or permission of the instructor. Dual-listing: POLS 470.

POLS 679. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

POLS 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

POLS 695. Field Experience. 1-15 Credits.

POLS 696. Special Topics. 1-5 Credits.

POLS 701. Quantitative Methods for Public Policy. 3 Credits.
An introduction to quantitative tools for policy analysis, program evaluation, and data- driven policy-making.

POLS 702. Qualitative Methods for Impact Evaluations. 3 Credits.
Techniques, tools and considerations for evaluating policy impacts using surveys, interviews, text analysis, and focus groups.

POLS 703. Advanced Policy Analysis. 3 Credits.
Advanced topics in causal and statistical inference for policy evaluation. Covers randomized controlled trials, survey experiments, and quasi-experimental designs. Addresses problems with measurement and sampling, randomization errors, non-compliance, and spillovers. Emphasizes practical issues in designing policy program evaluations to use these tools to produce causal conclusions. Prereq: POLS 701 or STAT 725; or permission of the instructor.

POLS 705. Policy Design and Evaluation. 3 Credits.
Strategies for developing and evaluating effective public policy.

POLS 710. Global Public Policy. 3 Credits.
An introduction to key challenges in the development and implementation of policies that affect populations outside the US, including American foreign policy and overseas development assistance.

POLS 724. Public Budgeting and Finance. 3 Credits.
This course provides students with an advanced understanding of government budgeting at the local, state, and national levels. It reviews the technical elements of budgeting as well as how politics shapes this process from start to finish. This class recognizes that in order to achieve policy goals you must first find a way of paying for it. Just how funds are allocated by elected and appointed officials determines government policy.

POLS 726. Harm Reduction for Policymakers. 3 Credits.
In this course students will learn to systematically anticipate the benefits and harms caused by policy or policy evaluations and adapt interventions to maximize benefit and minimize harm. Prereq: POLS 705.

POLS 762. New Institutionalism in Political Science. 3 Credits.
This course surveys the new institutionalist literature in political science and examines applications of rational choice theory, and its extensions, to problems of politics and governance, while drawing on both theoretical and empirical research at the intersection of economics and political science.

POLS 780. Masters of Public Policy Capstone. 3 Credits.
Provides a culminating application experience for Masters of Public Policy students.

POLS 793. Individual Study/Tutorial. 1-5 Credits.

POLS 797. Master's Paper. 1-3 Credits.

POLS 798. Masters Thesis. 1-10 Credits.
Master's thesis.

Precision Agriculture (PAG)

PAG 115. Introduction to Precision Agriculture. 2 Credits.
This course is designed to introduce the student to a broader view of the precision agriculture, crop and livestock production in precision agriculture, fundamental concepts of GIS, GPS, sensors, drones, data acquisition and management, Remote sensing. The course is offered in 2 fifty mins lectures per week. Co-req: MATH 103.

PAG 115L. Introduction to Precision Agriculture Lab. 1 Credit.
This laboratory course is designed to teach students Precision Ag hands on experiences include drone flying, precision ag mapping, field visit and ag robotic demonstration. Co-req: PAG 115.

PAG 191. Seminar. 1-5 Credits.

PAG 215. Mapping of Precision Ag Data. 3 Credits.
The course is designed to introduce students to currently technologies and software solutions being used for data collection, storage, and analysis to support more informed crop management decisions. The course is offered as two 50-minute lectures and one 2-hour lab per week. Prereq: PAG 115.

PAG 291. Seminar. 1-5 Credits.
Seminar.

PAG 315. Electronic Systems in Precision Ag. 3 Credits.
This course is designed to introduce the student to understand the basics of electronic systems and applications in precision ag. The students will learn topics like signal processing, electric motor, serial control and communications data network for tractors and machinery for agriculture applications. The course is offered in two 50 mins lectures and one 100 mins laboratory per week. Prereq: PAG 215 and PHYS 120.

PAG 348. Agricultural Technology Exposition. 1 Credit.
This course provides understanding of showing and explaining the latest innovations in agricultural technology. Students practice good communication skills and learn task management for completion of a project. Higher level thinking skills are used and demonstrated through preparing displays for public viewing and interaction. Cross-listed with ASM.

PAG 394. Individual Study. 1-5 Credits.

PAG 454. Applications of Precision Agriculture. 3 Credits.
The course is designed to introduce students to current technologies that are being used for crop production, and how to use the data collected by them to make more informed crop management decisions. The course is offered as two 50-minute lectures and one lab meeting per week. Prereq: PAG 215. {Also offered for graduate credit - See PAG 654.}.

PAG 455. Applications of Big Data in Precision Agriculture. 3 Credits.
The course is designed to introduce students to basics concepts regarding big data, how big data relates to precision agriculture, and how big data analysis approaches are using precision agriculture related data to enhance crop management and production. The course is offered as two 50-minute lectures and a 2.5 hour lab per week. Prereq: PAG 454.

PAG 475. Precision Ag Systems Capstone. 2 Credits.
Capstone learning experience involving team solutions to relevant problems in precision agriculture, which involves project planning and execution, including technical communication, budgeting, team management, and timelines. Emphasis will be on the team management, professionalism, communication skills, formal written report, and formal oral presentation. Prereq: PAG 315, PAG 454 and senior standing.

PAG 493. Undergraduate Research. 1-5 Credits.

PAG 496. Field Experience/Practicum. 1-15 Credits.

PAG 654. Applications of Precision Agriculture. 3 Credits.
The course is designed to introduce students to current technologies that are being used for crop production, and how to use the data collected by them to make more informed crop management decisions. The course is offered as two 50-minute lectures and one lab meeting per week. {Also offered for undergraduate credit - See PAG 454.}.

PAG 690. Seminar. 1-5 Credits.

PAG 794. Practicum/Internship. 1-8 Credits.

PAG 795. Field Experience. 1-15 Credits.

Psychology (PSYC)

PSYC 111. Introduction to Psychology. 3 Credits.
Survey of the scientific study of behavior and mental processes.

PSYC 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

PSYC 194. Individual Study. 1-5 Credits.

PSYC 196. Field Experience. 1-15 Credits.

PSYC 199. Special Topics. 1-5 Credits.

PSYC 210. Human Sexuality. 3 Credits.
Survey of biological, developmental, and psychological aspects of human sexuality. Prereq: PSYC 111.

PSYC 211. Introduction To Behavior Modification. 3 Credits.
Basic principles and procedures governing acquisition, maintenance, and change of behavior, emphasizing human applications. Laboratory involves designing, implementing, and reporting an individual project. Prereq: PSYC 111.

PSYC 212. Psychological Aspects of Drug Use and Abuse. 3 Credits.
Examination of legal and illegal psychoactive drugs. Emphasis on psychological, physiological, and behavioral effects of these drugs and problems of drug abuse. Prereq: PSYC 111.

PSYC 214. Social Interaction. 3 Credits.
Examination of issues relevant to the study of individual behavior (e.g., self-concept, attitudes, social perception) in a social context. Cross-listed with SOC 214.

PSYC 216. Cultural Psychology. 3 Credits.
Examines the different ways in which cultural variables affect human cognition, emotion, and behavior. This course uses the lens of culture to consider topics such as cognition and emotion, personality, psychopathology, the self, prejudice and intergroup relations, and cultural conflict (e.g., terrorism, genocide). Prereq: PSYC 111.

PSYC 221. Psychology Applied to Work. 3 Credits.
Applications of psychology to people at work. Topics include employee selection, job interviewing, performance appraisal, psychological testing, Equal Employment Opportunity, leadership, motivation, job satisfaction, organizational theory, employee safety and health. Prereq: PSYC 111.

PSYC 250. Developmental Psychology. 3 Credits.
Survey of the psychology of human life span development. Coverage also includes heredity and prenatal development. Prereq: PSYC 111.

PSYC 260. Introduction to Neuroscience. 3 Credits.
An introduction to behavioral neuroscience with an emphasis on what we know about human brain function and what it means for studying and understanding complex human behavior.

PSYC 263. Introduction to Cognitive Psychology. 3 Credits.
An introduction to the scientific study of human cognition covering topics including perception, attention, memory, language, reasoning, problem solving, and intelligence. Prereq: PSYC 111.

PSYC 270. Abnormal Psychology. 3 Credits.
Survey of the classification, symptoms, and etiology of psychological disorders. Attention given to diagnosis, etiology, and treatment according to prominent theoretical perspectives. Focus on empirical basis for understanding these problems. Prereq: PSYC 111.

PSYC 280. Introduction to Health Psychology. 3 Credits.
Describes the interaction of psychology and health, including the ways in which thoughts, emotions, and behavior influence one's health. Prereq: PSYC 111.

PSYC 291. Seminar. 1-5 Credits.

PSYC 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PSYC 294. Individual Study. 1-5 Credits.

PSYC 299. Special Topics. 1-5 Credits.

PSYC 311. Behavior Management and Change. 3 Credits.
Covers topics associated with the establishment, maintenance and change of behavior utilizing the techniques, theories and methods of psychology. Although the material will be of value for personal concerns, the focus will be on professional applications of behavior management and change to settings such as health, management, coaching, education, human services, business, and self-development.

PSYC 322. Judgment & Decision-Making. 3 Credits.
Covers the functional uses of critical thinking. Focuses on uses in problem solving and decision-making. Applications are directed at both personal and professional concerns. Prereq: PSYC 111.

PSYC 340. Psychology in Sport. 3 Credits.
This is a survey course outlining the applications of psychological theory to sport settings. Prereq: PSYC 111.

PSYC 350. Research Methods I. 3 Credits.
This course teaches scientific method and analysis of data for the social and behavioral sciences. Students completing this course will gain an understanding of descriptive and inferential analyses, including correlation, group comparisons, and non-parametric techniques. Prereq: PSYC 111, MATH 103 or MATH 104 or higher.

PSYC 351. Research Methods II. 3 Credits.
Experimental and quasi-experimental designs in psychological research. Laboratory includes performance of experiments, data analysis, and preparation of research reports. Prereq: PSYC 350.

PSYC 370. Forensic Psychology. 3 Credits.
Broad overview of the interactions of psychology and the law, including current areas of practice, assessment, and forensic techniques. Special focus upon psychology as applied to and affected by family, civil, and criminal law. Prereq: PSYC 270.

PSYC 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PSYC 380. Clinical Psychology. 3 Credits.
Introduction to the science and practice of clinical psychology. Includes a survey of the assumptions on which clinical methods are based and an overview of clinical assessment and treatment techniques. Prereq: PSYC 270.

PSYC 381. Understanding Suicideand its Impact. 3 Credits.
Overview of current understanding of the dynamics of suicide and its impact upon people left behind following the death.

PSYC 382. Self-Injury:Recognition & Treatment. 3 Credits.
Overview of the current understanding of the dynamics of self injurious behavior, of the prevalence of various types of harmful behavior, and of the populations most at risk.

PSYC 385. Psychology on Film. 3 Credits.
Many important issues and topics in psychology have been portrayed in feature films and documentaries. Movies and associated readings present significant concepts, persons, and historical events in psychology. Primary focus is on clinical psychology. Prereq: PSYC 111.

PSYC 391. Seminar. 1-5 Credits.

PSYC 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PSYC 394. Individual Study. 1-5 Credits.

PSYC 397. Coop/Internship. 1-5 Credits.

PSYC 399. Special Topics. 1-5 Credits.

PSYC 411. Preparing for Graduate School in Psychology. 1 Credit.
Career exploration, graduate program identification and evaluation, preparation for the application and selection process in psychology. Recommended for juniors, but open to students at all levels.

PSYC 440. Experimental Methods. 3 Credits.
Intermediate experimental design and data analysis with emphasis on the general linear model and computer-based approaches to data analysis. Prereq: PSYC 351. {Also offered for graduate credit - see PSYC 640.}.

PSYC 450. Computational Methods in Experimental Psychology. 3 Credits.
An introduction to fundamental research methods in visual and cognitive neuroscience. This is a computer-based course using MatLab and Psychtoolbox to prepare students for modern psychology laboratory research. Prereq: PSYC 260 or PSYC 351. {Also offered for graduate credit - see PSYC 650.}.

PSYC 453. Organizational Psychology. 3 Credits.
Survey of topics related to application of psychology to organizational settings. Emphasis on the theoretical bases of individual (leadership, decision making) and social (influence, work group) factors involved in work behavior. 12 credits in psychology and/or management recommended. Prereq: Junior standing. {Also offered for graduate credit - see PSYC 653.}.

PSYC 457. Managing Work Motivation and Morale. 3 Credits.
An exploration of how the theories of work motivation and morale can be applied to manage the behavior and performance of people at work. Cognitive, behavioral, attitudinal, organizational and individual psychological approaches are considered. Prereq: PSYC 111. {Also offered for graduate credit - see PSYC 657.}.

PSYC 460. Sensation & Perception. 3 Credits.
Explores physical, anatomical, and physiological bases of sensation and perception and their psychophysical measurement. Laboratory experiments complement lectures and demonstrate various experimental techniques and sensory phenomena. 2 lectures, equivalent of 2-hour laboratory. Prereq: PSYC 351 or PSYC 260. {Also offered for graduate credit - see PSYC 660.}.

PSYC 461. Memory And Knowledge. 3 Credits.
Examination of current behavioral and neuropsychological research and theory in the area of memory and knowledge representation. Various cognitive phenomena are demonstrated and relevant design issues are highlighted via laboratory experiments. Prereq: PSYC 260 or PSYC 351. {Also offered for graduate credit - see PSYC 661.}.

PSYC 463. Experimental Developmental Psychology. 3 Credits.
Examination of historical and contemporary theory and research in cognitive development. Topics include development of visual processing, language skills, concepts, and social cognition, with particular emphasis on methods of investigating psychological development. Prereq: PSYC 351. {Also offered for graduate credit - see PSYC 663.}.

PSYC 464. Attention & Thinking. 3 Credits.
Examines current behavioral and neuropsychological research and theory in the area of attention and thought processes. Laboratory experiments will demonstrate various attentional phenomena and highlight relevant design issues. Prereq: PSYC 351.{Also offered for graduate credit - see PSYC 664.}.

PSYC 465. Psychobiology. 3 Credits.
Fundamental anatomy (structure) and physiology (function) of the nervous system. Physiological bases of behavior. 2 lectures, equivalent of 2-hour laboratory. Prereq: PSYC 351 or PSYC 260. {Also offered for graduate credit - see PSYC 665.}.

PSYC 468. Personality. 3 Credits.
Study of complex human behavior with attention to historically significant theories and current empirical issues. Laboratory experiences illustrate methods of investigating individual differences. Prereq: PSYC 351. {Also offered for graduate credit - see PSYC 668.}.

PSYC 470. Experimental Social Psychology. 3 Credits.
Examination of historical and contemporary theory and research in social psychology. Study of the relationship between the individual and social context. 2 lectures, equivalent of 2-hour laboratory. Prereq: PSYC 351. {Also offered for graduate credit - see PSYC 670.}.

PSYC 471. The Psychology Of Aging. 3 Credits.
Survey of cognitive and psychosocial development in adulthood and old age, including psychopathologies of old age. Contemporary research findings are emphasized. Prereq: PSYC 111, Junior standing. {Also offered for graduate credit - see PSYC 671.}.

PSYC 472. Advanced Psychopathology. 3 Credits.
In-depth coverage of recent research on diagnosis, etiology, and maintenance of behavior disorders emphasizing the interaction of biological, behavioral, and social factors. Prereq: PSYC 270, Junior standing. {Also offered for graduate credit - see PSYC 672.}.

PSYC 473. Child Psychopathology and Therapy. 3 Credits.
Overview of the etiology and treatment of behavior disorders in children and adolescents. Emphasis on recent research findings and behavioral intervention strategies. Prereq: PSYC 270 or PSYC 351. {Also offered for graduate credit - see PSYC 673.}.

PSYC 480. History & Systems. 3 Credits.
Historical development of scientific psychology. Emphasis on the development of various systems of psychology in America. Capstone experience. Prereq: PSYC 351 or Senior standing. {Also offered for graduate credit - see PSYC 680.}.

PSYC 481. Health Psychology. 3 Credits.
Application of behavioral procedures to the prevention, treatment, and rehabilitation of medical disorders. Emphasis on contemporary research findings. Prereq: PSYC 350 or PSYC 260. {Also offered for graduate credit - see PSYC 681.}.

PSYC 486. Neuropsychology. 3 Credits.
Introduction to human neuropsychology with emphasis on the neural basis of motor, perceptual, cognitive, emotive, and language behavior. Topics include normal and pathological conditions from clinical and experimental perspectives. Prereq: PSYC 260 or PSYC 351. {Also offered for graduate credit - see PSYC 686.}.

PSYC 489. Honors Thesis. 1-6 Credits.
Capstone experience option.

PSYC 491. Seminar. 1-5 Credits.

PSYC 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PSYC 493. Undergraduate Research. 1-5 Credits.

PSYC 494. Individual Study. 1-5 Credits.

PSYC 496. Field Experience. 1-15 Credits.

PSYC 499. Special Topics. 1-5 Credits.

PSYC 640. Experimental Methods. 3 Credits.
Intermediate experimental design and data analysis with emphasis on the analysis of variance. Laboratory includes data analysis on the computer. {Also offered for undergraduate credit - see PSYC 440.}.

PSYC 650. Computational Methods in Experimental Psychology. 3 Credits.
An introduction to fundamental research methods in visual and cognitive neuroscience. This is a computer-based course using MatLab and Psychtoolbox to prepare students for modern psychology laboratory research. {Also offered for undergraduate credit - see PSYC 450.}.

PSYC 653. Organizational Psychology. 3 Credits.
Survey of topics related to application of psychology to organizational settings. Emphasis on the theoretical bases of the individual (leadership, decision making) (motivation, satisfaction) and social (influence, workgroup) (leadership, work group) factors involved in work behavior. {Also offered for undergraduate credit - see PSYC 453.}.

PSYC 657. Managing Work Motivation and Morale. 3 Credits.
An exploration of how the theories of work motivation and morale can be applied to manage the behavior and performance of people at work. Cognitive, behavioral, attitudinal, organizational and individual psychological approaches are considered. {Also offered for undergraduate credit - see PSYC 457.}.

PSYC 660. Sensation & Perception. 3 Credits.
Explores physical, anatomical, and physiological bases of sensation and perception and their psychophysical measurement. Laboratory experiments complement lectures and demonstrate various experimental techniques and sensory phenomena. 2 lectures, equivalent of 2-hour laboratory. {Also offered for undergraduate credit - see PSYC 460.}.

PSYC 661. Memory and Knowledge. 3 Credits.
Examination of current behavioral and neuropsychological research and theory in the area of memory and knowledge representation. Various cognitive phenomena are demonstrated and relevant design issues are highlighted via laboratory experiments. {Also offered for graduate credit - see PSYC 461.}.

PSYC 663. Experimental Developmental Psychology. 3 Credits.
Examination of historical and contemporary theory and research in social and cognitive development. Topics include attachment, adolescent risk-taking, theories of intelligence, and meta-cognition. Laboratory experiences illustrate methods of investigating psychological development. {Also offered for undergraduate credit - see PSYC 463.}.

PSYC 664. Attention & Thinking. 3 Credits.
Examines current behavioral and neuropsychological research and theory in the area of attention and thought processes. Laboratory experiments will demonstrate various attentional phenomena and highlight relevant design issues. {Also offered for undergraduate credit - see PSYC 464.}.

PSYC 665. Psychobiology. 3 Credits.
Fundamental anatomy (structure) and physiology (function) of the nervous system. Physiological bases of behavior. 2 lectures, equivalent of 2-hour laboratory. {Also offered for undergraduate credit - see PSYC 465.}.

PSYC 668. Personality. 3 Credits.
Study of complex human behavior with attention to historically significant theories and current empirical issues. Laboratory experiences illustrate methods of investigating individual differences. {Also offered for undergraduate credit - see PSYC 468.}.

PSYC 670. Experimental Social Psychology. 3 Credits.
Examination of historical and contemporary theory and research in social psychology. Study of the relationship between the individual and social context. 2 lectures, equivalent of 2-hour laboratory. {Also offered for undergraduate credit - see PSYC 470.}.

PSYC 671. The Psychology Of Aging. 3 Credits.
Survey of cognitive and psychosocial development in adulthood and old age, including psychopathologies of old age. Contemporary research findings are emphasized. {Also offered for undergraduate credit - see PSYC 471.}.

PSYC 672. Advanced Psychopathology. 3 Credits.
In-depth coverage of recent research on diagnosis, etiology, and maintenance of behavior disorders emphasizing the interaction of biological, behavioral, and social factors. {Also offered for undergraduate credit - see PSYC 472.}.

PSYC 673. Child Psychopathology and Therapy. 3 Credits.
Overview of the etiology and treatment of behavior disorders in children and adolescents. Emphasis on recent research findings and behavioral intervention strategies. {Also offered for undergraduate credit - see PSYC 473.}.

PSYC 680. History & Systems. 3 Credits.
Historical development of scientific psychology. Emphasis on the development of various systems of psychology in America. Capstone experience. {Also offered for undergraduate credit - see PSYC 480.}.

PSYC 681. Health Psychology. 3 Credits.
Application of behavioral procedures to the prevention, treatment, and rehabilitation of medical disorders. Emphasis on contemporary research findings. {Also offered for undergraduate credit - see PSYC 481.}.

PSYC 686. Neuropsychology. 3 Credits.
Introduction to human neuropsychology with emphasis on the neural basis of motor, perceptual, cognitive, emotive, and language behavior. Topics include normal and pathological conditions from clinical and experimental perspectives. {Also offered for undergraduate credit - see PSYC 486.}.

PSYC 690. Graduate Seminar. 1-3 Credits.

PSYC 695. Field Experience. 1-15 Credits.

PSYC 696. Special Topics. 1-5 Credits.

PSYC 718. Visual Neuroscience. 3 Credits.
A detailed survey of current ideas, methods, and perspectives in visual neuroscience.

PSYC 720. Advanced Topics in Cognitive Neuroscience. 3 Credits.
Examines prominent theories, research approaches, and experimental findings in the field of cognitive neuroscience. Included topics are methodological issues and cognitive neuroscience approaches to research questions in a broad range of areas within cognitive psychology.

PSYC 727. Advanced Topics in Visual Perception. 3 Credits.
Integrated overview of the field of vision research. Addresses recent developments in the study of the phenomenology, psychophysics, and neural substrates of human visual sensation and perception.

PSYC 731. Advanced Topics in Cognition. 3 Credits.
This course explores fundamental issues in cognitive psychology, covering historical development, current controversies, and future directions. We will examine how theory and research in cognitive psychology relate to other areas in psychology and apply to everyday human experiences.

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 applications of regression with a focus on multilevel regression models used to analyze nested cross-sectional and longitudinal data. Includes analysis using computer software. Prereq: PSYC 640 and PSYC 761 or instructor permission.

PSYC 763. Grant Writing for Psychological Scientists. 3 Credits.
This course familiarizes graduate students with methods for finding and securing grants in the psychological sciences. Readings, in-class discussions, and writing/reviewing workshops will help students prepare to make their own grant submissions.

PSYC 764. Advanced Topics in Attention. 3 Credits.
Examines prominent theories of attention and empirical evidence in support of those theories. Included topics focus on the role of attention in thought, perception, and action.

PSYC 770. Testing and Assessment. 3 Credits.
Introduction to scale construction and test theory. Administration, interpretation, and reporting of intelligence and objective personality testing.

PSYC 771. Advanced Topics in Social Psychology. 3 Credits.
Explores theoretical and methodological approaches to studying the human experience in a social context.

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 Topics in Health Psychology. 3 Credits.
Provides an in-depth exploration of theories and methods used to understand psychological influences on how people stay healthy, why they become ill, and how they respond when they do get ill. Prereq: PSYC 670, 681.

PSYC 790. Graduate Seminar. 1-3 Credits.

PSYC 791. Temporary/Trial Topics. 1-5 Credits.

PSYC 793. Individual Study/Tutorial. 1-5 Credits.

PSYC 794. Practicum/Internship. 1-8 Credits.

PSYC 795. Field Experience. 1-15 Credits.

PSYC 796. Special Topics. 1-5 Credits.

PSYC 797. Master's Paper. 1-3 Credits.

PSYC 798. Master's Thesis. 1-10 Credits.

PSYC 892. Graduate Teaching Experience. 1-6 Credits.

PSYC 893. Individual Study/Tutorial. 1-5 Credits.

PSYC 894. Practicum/Internship. 1-8 Credits.

PSYC 897. Cooperative Education. 1-4 Credits.

PSYC 899. Doctoral Dissertation. 1-15 Credits.

Public Health (PH)

Courses

PH 101. Introduction to Public Health. 3 Credits.
This course introduces undergraduate students to the interdisciplinary and exciting field of public health. Discussing and studying the processes and practices of public health enhances the population health perspective of healthcare and other professionals.

PH 190. Critical Thinking, Academic, and Professional Skills for the Health Professions. 3 Credits.
This course provides students with opportunities to develop proficient critical thinking and clinical problem-solving skills as they are used in the health professions. This course will also immerse students in reasoning-related activities that facilitate academic success, teamwork, and a demonstrated commitment to the roles and responsibilities required of all health professionals. Cross-listed with ASCI 190 and PHRM 190.

PH 300. Introduction to the U.S. Health Care System. 3 Credits.
This course introduces students to the structure, design and groups who participate in the U.S. healthcare system. Emphasis will be placed on describing the roles of various health professions, organizations and/or settings in which health care is provided, and the mechanisms by which health care is financed. Students will gain an understanding of how these components frame major issues of health policy and public health that include, ensuring access to services, ensuring high quality care, and ensuring that care is provided efficiently. This course will also immerse students in reasoning-related activities that facilitate teamwork and a commitment to the roles and responsibilities required of all health professionals. Prereq or Coreq: Junior or senior standing.

PH 301. Research Methods in Health Services. 3 Credits.
This course introduces students to tools and techniques used in health-related research and evidence-based medicine. Students will also develop skills and confidence necessary to read, synthesize, and evaluate the health services literature. Prereq: STAT 330 with a grade of C or higher. Prereq or Coreq: Junior or senior standing.

PH 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PH 452. Lifestyle Approaches to Prevention, Treatment, and Reversal of Disease. 3 Credits.
Explore Lifestyle Medicine and apply the science of lifestyle behaviors in the prevention, treatment, and reversal of disease. Prereq: BIOL 221, 221L. {Also offered for graduate credit - See PH 652.}.

PH 474. Epidemiology. 3 Credits.
Study of the distribution and dynamics of disease in populations. Presents principles and methods of epidemiologic investigation with a focus on infectious diseases. Prereq: PH 101. Dual-listing: PH 674.

PH 475. One Health. 2 Credits.
This course focuses on One Health concepts, emphasizing the interconnectivity between human, animal and environmental health. Prereq: Senior standing. Cross-listed with ANSC 475. Dual-listing: ANSC 675 and PH 675.

PH 477. Vaccinology. 3 Credits.
Vaccinology introduces the basic biological principles governing vaccinology, emphasizing vaccine development and testing, immunity, manufacture, and clinical aspects in veterinary and human medicine. Prereq: MICR 350. Cross-listed with MICR 477. Dual-listing: MICR 677 and PH 677.

PH 479. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PH 489. Health Services Capstone. 1 Credit.
The purpose of this course is to provide an opportunity for students to reflect upon their experiences in the Bachelor of Science in Health Services program, and use that opportunity for reflection to develop a comprehensive plan that integrates coursework taken throughout the program and posits a clear career trajectory based on that plan. Prereq or Coreq: Health Services major in their final semester of study.

PH 491. Seminar. 1-5 Credits.

PH 494. Individual Study. 1-5 Credits.

PH 496. Field Experience. 1-15 Credits.

PH 652. Lifestyle Approaches to Prevention, Treatment, and Reversal of Disease. 3 Credits.
Explore Lifestyle Medicine and apply the science of lifestyle behaviors in the prevention, treatment, and reversal of disease. Prereq: matriculated into the MPH program or public health certificate. {Also offered for undergraduate credit - See PH 452.}.

PH 674. Epidemiology. 3 Credits.
Study of the distribution and dynamics of disease in populations. {Also offered for undergraduate credit - see PH 474.}.

PH 675. One Health. 2 Credits.
This course focuses on One Health concepts, emphasizing the interconnectivity between human, animal and environmental health. Cross-listed with ANSC 675. Dual-listing: ANSC 475 and PH 475.

PH 677. Vaccinology. 3 Credits.
Vaccinology introduces the basic biological principles governing vaccinology, emphasizing vaccine development and testing, immunity, manufacture, and clinical aspects in veterinary and human medicine. Cross-listed with MICR 677. Dual-listing: PH 477.

PH 700. Preventing and Managing Chronic Illness. 3 Credits.
This course will explore the effects of chronic health issues on individuals, families, and lay caregivers from a public health and clinical systems perspective. PH students only.

PH 704. Public Health Management and Policy. 3 Credits.
The course will provide a pragmatic overview of the issues, constituents, processes, and tools of public health management and policy.

PH 705. Global Health. 3 Credits.
This course will survey the health of populations globally and introduce strategies, programs and health systems designed to improve the health of those populations. Prereq: Admission to PH program.

PH 706. Essentials of Epidemiology. 3 Credits.
Emphasis on application of the principles of epidemiology as applied to the investigation and prevention of individual and population health problems.

PH 711. Integrating Primary Care and Public Health. 3 Credits.
The course examines the role of primary care and public health in addressing personal and population health issues with particular attention to community health needs assessment, social determinants of health, health inequities, cultural competence, and community involvement to address contemporary challenges to the health of U.S. populations.

PH 712. Public Health Research Methods. 3 Credits.
This course provides an introduction to a variety of research methods and key components of a research study that can be employed in public health research and practice.

PH 720. Environmental Health. 2 Credits.
Analysis of key concepts, principles, and applications of the primary natural and social science disciplines that underpin the core of environmental health.

PH 722. Applied Community Health. 3 Credits.
This course is designed to provide students with knowledge and skills needed to address public health issues within community settings. Prereq: Public Health students only.

PH 725. Promoting Health through Policy, System and Environment. 3 Credits.
This course will focus on health promotion at community, state, and national levels through policy, system, and environment (PSE) strategies through readings, films, writing, and discussion.

PH 731. Biostatistics. 3 Credits.
This core course introduces the selection, use and interpretation of basic statistical tests and concepts that may be used in addressing, analyzing and solving problems in public health, biomedical and health care research.

PH 735. Principles of Infectious Disease Management I. 3 Credits.
The course is the first part of a two-part series that will provide a foundational overview of the major infectious diseases that have a significant impact on public health.

PH 736. Principles of Infectious Disease Management II. 3 Credits.
The course will build on PH 735, Principles of Infectious Disease Management I and focus on the epidemiology, clinical presentation, treatment, and control of the major communicable diseases. Prereq: PH 735.

PH 741. Social and Behavioral Sciences in Public Health. 3 Credits.
Foundation knowledge and competencies in applying social and behavioral sciences theories and methods to public health problems.

PH 745. Community Health Leadership. 3 Credits.
This course will focus on developing leadership and collaboration skills required by public health leaders to work with community leaders and organizations.

PH 750. Epidemiologic Methods I. 2 Credits.
This course covers the development of an observational epidemiologic study and the use and interpretation of methods and techniques for analyzing observational epidemiologic data. Prereq: PH 706, PH 712.

PH 752. Epidemiologic Methods II. 2 Credits.
Distribution and dynamics of disease in populations and methods for detecting and interpreting spatial patterns of disease.

PH 753. Public Health Surveillance. 2 Credits.
This course provides an introduction to public health surveillance and key characteristics of a variety of surveillance systems that can be utilized in all fields of public health practice. Lectures from experts in the field will provide real world examples and opportunities for students to interact with public health professionals.

PH 754. Health Survey Research. 2 Credits.
This course will familiarize students with the use of survey research methods. The course will cover practical issues in survey methods, with a focus on instrument development, mode of data collection, sampling, and minimizing survey error. The course will include hands-on development of a survey instrument, a cover letter, and a sampling plan.

PH 761. Injury Prevention. 1 Credit.
This course is intended to introduce students to the basic tenets of injury prevention. Additionally, the course will expose students to the epidemiology of numerous types of injury, and to public health methods to controlling and/or eliminating injuries.

PH 765. Cultural Competence in Health Professions. 3 Credits.
The purpose of this course is to provide education and skill building that will enable students to effectively utilize cultural and linguistic competence as a key tool to improve health outcomes and understanding of communication for diverse populations. PH students only.

PH 772. American Indian Health Equity. 3 Credits.
To provide a detailed overview of the basis for and regional differences in American Indian health inequity and disparities as well as strategies to reduce these in culturally appropriate ways. Prereq: Admission to the PH program.

PH 774. Research and Evaluation in Tribal Communities. 3 Credits.
The course will provide a detailed overview of the unique considerations for conducting health-related research and evaluation in Indigenous communities. Considerations include centering Indigenous ways of knowing and methodologies, creating community-driven research agendas, sovereignty, distrust of research and evaluation based on historical and contemporary abuses, effective partnerships with non-Indigenous allies, and strengths and limitations of datasets for addressing health disparities. Prereq: Admission to PH program.

PH 775. Case Studies in Indian Health. 3 Credits.
This course will provide an overview of several case studies in American Indian and Alaska Native Health that have been successfully implemented. The cases will be examined to determine what worked, why it worked, and challenges in developing successful programs. Prereq: Admission to the PH program.

PH 781. Foundations of Maternal and Child Health. 3 Credits.
Historical and theoretical foundations of maternal and child health (MCH) as well as policies and programs aimed to reduce morbidity, mortality, and health disparities in MCH populations will be covered.

PH 782. Introduction to Maternal and Child Health Epidemiology. 2 Credits.
This course provides an introduction to maternal and child health epidemiology and key metrics to describe the local, national and global status of the maternal and child health population. Requires admission to the MPH or PH certificate programs.

PH 785. Women's Health. 2 Credits.
This course will explore historical, social, behavioral, cultural, and environmental issues that impact women's health, as well as medical and public health interventions and programming that promote women's health.

PH 789. Integrative Learning Experience. 1 Credit.
Students must complete an integrative learning experience (ILE) that demonstrates synthesis of foundational and concentration competencies selected based on student's educational and professional goals. Must have department permission to register.

PH 790. Graduate Seminar. 1-5 Credits.

PH 793. Individual Study. 1-5 Credits.

PH 794. Practicum. 1-8 Credits.

PH 795. Field Experience. 1-15 Credits.

PH 797. Master's Paper. 1-3 Credits.

PH 798. Master's Thesis. 1-10 Credits.

PH 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

PH 899. Doctoral Dissertation. 1-15 Credits.

Publishing (PUB)

PUB 472. Introduction to Publishing. 3 Credits.
This introductory class will familiarize students with the history, business, and practice of small press publishing. Course lectures, readings, and activities focus on various facets of publishing history, production, and marketing processes. The course includes an orientation to North Dakota State University Press - a teaching and academic press located on the NDSU campus - and a hands-on experience in publishing a current chapbook manuscript for the press. The course will address the following areas of small press publishing: history of the small press movement; the history and aesthetics of the book; manuscript acquisitions and editing; the business of publishing; design aspects of publishing; copyright laws and permissions; promotion and marketing; and digital publishing. Dual-listing: PUB 672.

PUB 476. Practicum in Publishing. 3 Credits.
The Practicum in Publishing implements knowledge and background gained during the Introduction to Publishing course. Students will obtain and apply the skills of a publisher as they undertake editorial, publicity, and marketing activities for the following year's book releases. Students will take on responsibilities of key roles in social media marketing and event development. This practicum offers in-depth, real-life experience with a decades-old publishing house, putting into practice current methods and customs of scholarly and literary publishing, while meeting real-time publishing deadlines and schedules in preparation for national distribution of North Dakota State University Press books. May be repeated for credit. Prereq: PUB 472. Dual-listing: PUB 676.

PUB 496. Field Experience. 1-15 Credits.

PUB 672. Introduction to Publishing. 3 Credits.
This introductory class will familiarize students with the history, business, and practice of small press publishing. Course lectures, readings, and activities focus on various facets of publishing history, production, and marketing processes. The course includes an orientation to North Dakota State University Press - a teaching and academic press located on the NDSU campus - and a hands-on experience in publishing a current chapbook manuscript for the press. The course will address the following areas of small press publishing: history of the small press movement; the history and aesthetics of the book; manuscript acquisitions and editing; the business of publishing; design aspects of publishing; copyright laws and permissions; promotion and marketing; and digital publishing. Dual-listing: PUB 472.

PUB 676. Practicum in Publishing. 3 Credits.
The Practicum in Publishing implements knowledge and background gained during the Introduction to Publishing course. Students will obtain and apply the skills of a publisher as they undertake editorial, publicity, and marketing activities for the following year's book releases. Students will take on responsibilities of key roles in social media marketing and event development. This practicum offers in-depth, real-life experience with a decades-old publishing house, putting into practice current methods and customs of scholarly and literary publishing, while meeting real-time publishing deadlines and schedules in preparation for national distribution of North Dakota State University Press books. May be repeated for credit. Prereq: PUB 672. Dual-listing: PUB 476.

PUB 695. Field Experience. 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 majors only.

RS 499. Special Topics. 1-5 Credits.

Range Science (RNG)

RNG 136. Introduction to Range Management. 3 Credits.
Principles of range management which include plant identification, range evaluation, and range improvement. 3 lectures. F.

RNG 194. Individual Study. 1-5 Credits.

RNG 196. Field Experience. 1-15 Credits.

RNG 213. Rangeland Sampling Techniques. 3 Credits.
Introduction to rangeland aquatic, invertebrate, soil, and vegetation sampling techniques, and the proper procedures for basic data entry and interpretation. Prereq: RNG 136.

RNG 225. Natural Resource & Agro-Ecosystems. 3 Credits.
Introduction to scientific theories and their relation to natural resources and agriculture. Influence of these theories on current perspectives toward the environment. 3 lectures. Cross-listed with NRM 225.

RNG 294. Individual Study. 1-5 Credits.

RNG 296. Field Experience. 1-15 Credits.

RNG 394. Individual Study. 1-5 Credits.

RNG 397. Fe/Coop Ed/Internship. 1-15 Credits.

RNG 450. Range Plants. 3 Credits.
Identification, distribution, and forage value of important U.S. range plants. 1 lecture, 2 two-hour laboratories. {Also offered for graduate credit - see RNG 650.}.

RNG 451. Ecology of Fire-Dependent Ecosystems. 3 Credits.
Overview of the evolution and ecology of wildland fire in fire-dependent ecosystems globally, with an emphasis on the ecology and management of fire in North America. Prereq: RNG 136 and BIOL 461. {Also available for graduate credit - see RNG 651.}.

RNG 452. Managing Natural and Rangeland Resources using GIS. 3 Credits.
The application of Geographic Information Systems to managing natural and rangeland resources will be investigated. Different natural and rangeland resource datasets, analysis methods, and software packages will be utilized. Cross-listed with NRM 452 and SOIL 452. Dual-listing: RNG 652.

RNG 453. Rangeland Resources Watershed Management. 3 Credits.
Study of the management of physical/biological settings and processes along with human activities on water and watersheds considering preventative and restorative strategies in a rangeland setting. Prereq: RNG 136 or NRM 225. Cross-listed with NRM 453. {Also offered for graduate credit - see RNG 653.}.

RNG 454. Wetland Resources Management. 3 Credits.
Principles of wetland systems, wetland management, wetland functions, wetland delineation, wetland assessment, and wetland improvement. Prereq: SOIL 210. Cross-listed with NRM 454 and SOIL 454. F (even years) {Also offered for graduate credit - see RNG 654.}.

RNG 456. Ecological Restoration. 3 Credits.
This course reviews ecological concepts inherent to ecosystem structure and function, including plant, soil, and animal ecology, and ecosystem response to disturbance. Furthermore, the course will illustrate how this ecological knowledge is used along with socioeconomic information to develop and implement effective restoration projects in both terrestrial and aquatic ecosystems. Cross-listed with NRM 456 and SOIL 456. Dual-listing: RNG 656, NRM 656 and SOIL 656.

RNG 458. Grazing Ecology. 3 Credits.
Grazing processes and systems and their effects on plants and herbivores. 3 lectures. Prereq: RNG 136. F (even years) {Also offered for graduate credit - see RNG 658.}.

RNG 462. Natural Resource and Rangeland Planning. 3 Credits.
Capstone experiencefor School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Prereq: at least senior standing and must be a Natural Resources Management, Range Science or Soil Science major. Cross-listed with NRM and SOIL. {Also offered for graduate credit - see RNG 662.}.

RNG 491. Seminar. 1-5 Credits.

RNG 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

RNG 494. Individual Study. 1-5 Credits.

RNG 496. Field Experience. 1-15 Credits.

RNG 650. Range Plants. 3 Credits.
Identification, distribution, and forage value of important U.S. range plants. 1 lecture, 2 two-hour laboratories. {Also offered for undergraduate credit - see RNG 450.}.

RNG 651. Ecology of Fire-Dependent Ecosystems. 3 Credits.
Overview of the evolution and ecology of wildland fire in fire-dependent ecosystems globally, with an emphasis on the ecology and management of fire in North America. {Also available for undergraduate credit - see RNG 451.}.

RNG 652. Managing Natural and Rangeland Resources using GIS. 3 Credits.
The application of Geographic Information Systems to managing natural and rangeland resources will be investigated. Different natural and rangeland resource datasets, analysis methods, and software packages will be utilized. Cross-listed with NRM 652 and SOIL 652. Dual-listing: RNG 452.

RNG 653. Rangeland Resources Watershed Management. 3 Credits.
Study of the management of physical/biological settings and processes along with human activities on water and watersheds considering preventative and restorative strategies in a rangeland setting. Cross-listed with NRM 653. {Also offered for undergraduate credit - see RNG 453.}.

RNG 654. Wetland Resources Management. 3 Credits.
Principles of wetland systems, wetland management, wetland functions, wetland assessment, and wetland improvement. {Also offered for undergraduate credit - see RNG 454.}.

RNG 656. Ecological Restoration. 3 Credits.
This course reviews ecological concepts inherent to ecosystem structure and function, including plant, soil, and animal ecology, and ecosystem response to disturbance. Furthermore, the course will illustrate how this ecological knowledge is used along with socioeconomic information to develop and implement effective restoration projects in both terrestrial and aquatic ecosystems. Cross-listed with NRM 656 and SOIL 656. Dual-listing: RNG 456.

RNG 658. Grazing Ecology. 3 Credits.
Grazing processes and systems and their effects on plants and herbivores. 3 lectures. F (even years) {Also offered for undergraduate credit - see RNG 458.}.

RNG 662. Natural Resources and Rangeland Planning. 3 Credits.
Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Cross-listed with NRM and SOIL. {Also offered for undergraduate credit - see RNG 462}.

RNG 695. Field Experience. 1-15 Credits.

RNG 716. Agrostology. 3 Credits.
Identification and description of U.S. grasses and grass-like plants. 2 lectures, 2 two-hour laboratories. F (even years).

RNG 717. Aquatic Vascular Plants. 3 Credits.
Identification of major aquatic vascular plants in the Northern Great Plains, utilization of major plant identification keys for the region, and descriptions of ecological roles of species for utilization in assessment, monitoring, and delineation. 1 lecture, 2 two-hour laboratories. F (odd years).

RNG 737. Agroecosystem Management and Conservation. 3 Credits.
Discussion and field course that emphasizes current conservation and management practices influencing agroecosystems. The overarching concepts will link soils, vegetation, invertebrates, vertebrates and society.

RNG 749. Applied Global Change Ecology. 3 Credits.
Discussion driven course that emphasizes current peer-review literature investigating the influence of human-driven global changes on natural resources. The class will include topics ranging from climate change to energy expansion and assisted colonization.

RNG 765. Analysis Of Ecosystems. 3 Credits.
Introduction to advanced statistical techniques to evaluate plant communities, plant-animal interactions, and plant-soil relationships. Emphasis on multivariate analysis. 2 lectures, 1 two-hour laboratory. S (even years).

RNG 790. Graduate Seminar. 1-5 Credits.

RNG 791. Temporary/Trial Topics. 1-5 Credits.

RNG 792. Graduate Teaching Experience. 1-6 Credits.

RNG 793. Individual Study/Tutorial. 1-5 Credits.

RNG 794. Practicum/Internship. 1-8 Credits.

RNG 795. Field Experience. 1-15 Credits.

RNG 796. Special Topics. 1-5 Credits.

RNG 797. Master's Paper. 1-3 Credits.

RNG 798. Master's Thesis. 1-10 Credits.

RNG 892. Graduate Teaching Experience. 1-6 Credits.

RNG 899. Doctoral Dissertation. 1-15 Credits.

Religious Studies (RELS)

RELS 100. World Religions. 3 Credits.
Explores the beliefs, practices and origins of the world's major religions and introduces analytical approaches to studying religion.

RELS 194. Individual Study. 1-5 Credits.

RELS 196. Field Experience. 1-15 Credits.

RELS 199. Special Topics. 1-5 Credits.

RELS 220. Old Testament. 3 Credits.
Study of the religious, political, and social history of ancient Israel as reflected in the Hebrew Bible.

RELS 230. New Testament. 3 Credits.
Survey of the religious, political, and social history of the New Testament and other early Christian literature.

RELS 240. "Cults" and New Religious Movements. 3 Credits.
This course examines the creation and sustainability of new religious movements, including Scientology, Jehovah's Witness, Aum Shinrikyo, Peoples Temple, and the Church of Jesus Christ of Latter-day Saints, and the history of anti-cult movements. Cross-listed with HIST.

RELS 270. American Religious History. 3 Credits.
Introduction to the basic issues in American history including the study of Puritans, immigration, church and state, revivalism, civil and military religion, apocalypticism, and new age religion. Cross-listed with HIST 270.

RELS 291. Seminar. 1-5 Credits.

RELS 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

RELS 294. Individual Study. 1-5 Credits.

RELS 299. Special Topics. 1-5 Credits.

RELS 315. Contemporary Religion. 3 Credits.
Study of how contemporary cultural developments require the rethinking of historic religious perspectives in such topics as natural science, political thought, psychology, history, and gender.

RELS 320. History of Christianity. 3 Credits.
A study of Christianity's formation, the rise of the Catholic Church, Eastern Christianity, the Reformation, monasticism, Pentecostalism, liberation theology, and global missions. Cross-listed with HIST 320.

RELS 335. History of Judaism. 3 Credits.
Survey of major historical, religious, and cultural developments in Jewish traditions from the early Second Temple period to the present.

RELS 345. Church and State in America. 3 Credits.
Study the entanglements of religion and the state in America, including its impacts on religious liberty, gender, sexuality, race, foreign relations, and religious nationalism. Cross-listed with HIST 345.

RELS 355. Global Islam. 3 Credits.
Examination of the foundational history, texts, laws, and rituals of Islam, in addition to the lived experience of Islam and related political dynamics in the Middle East, Europe, Asia, Africa, and North America. Cross-listed with HIST 355.

RELS 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

RELS 391. Seminar. 1-5 Credits.

RELS 394. Individual Study. 1-5 Credits.

RELS 399. Special Topics. 1-5 Credits.

RELS 401. Sociology of Religion. 3 Credits.
See Sociology for description. {Also offered for graduate credit - see RELS 601.}.

RELS 410. Religion and Violence. 3 Credits.
An analysis and assessment of critical theories on religion and violence, including examinations of martyrdom and redemptive suffering, the violence of social stratification and "othering", war and terrorism, and apocalyptic and spiritual warfare.

RELS 453. Magic And Religion. 3 Credits.
Comparative religion, religious concepts, practices, and practitioners. In-depth study of selected religious systems with a focus on shamanic religions. Prereq: ANTH 111. Cross-listed with ANTH 453.

RELS 491. Seminar. 1-5 Credits.

RELS 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

RELS 493. Undergraduate Research. 1-5 Credits.

RELS 494. Individual Study. 1-5 Credits.

RELS 496. Field Experience. 1-15 Credits.

RELS 499. Special Topics. 1-5 Credits.

RELS 793. Individual Study. 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. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

RC 294. Individual Study. 1-5 Credits.

RC 299. Special Topics. 1-5 Credits.

RC 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

RC 391. Seminar. 1-5 Credits.

RC 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

RC 394. Individual Study. 1-5 Credits.

RC 399. Special Topics. 1-5 Credits.

RC 491. Seminar. 1-5 Credits.

RC 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

RC 494. Individual Study. 1-5 Credits.
Respiratory Care majors only.

RC 496. Field Experience. 1-15 Credits.
Respiratory Care majors only.

RC 499. Special Topics. 1-5 Credits.

Science, Technology, Engineering, and Mathematics (STEM)

STEM 303. The Science of Learning. 1 Credit.
This course is designed for students serving as Learning Assistants in the College of Science and Mathematics and who are interested in the science behind learning in the STEM disciplines.

STEM 494. Individual Study. 1-5 Credits.

STEM 790. Graduate Seminar. 1-5 Credits.

STEM 795. Field Experience. 1-15 Credits.

STEM 810. Teaching College Science. 3 Credits.
This course is designed for graduate students in the sciences who are interested in learning more about science teaching and student learning at the undergraduate level.

STEM 820. STEM Curriculum and Instruction. 3 Credits.
This course focuses on research on assessment and curricula designed to identify and address conceptual and reasoning difficulties of students in math and science. A variety of assessments and research-based curricula will be used and critically analyzed. Issues related to challenges of implementing reform-based curricula will also be discussed.

STEM 830. Research Methods in STEM Education. 3 Credits.
Course covers an array of research methods that are commonly used within discipline-based education research literature and discusses those methods within the framework of the primary literature of those disciplines.

STEM 840. Designing Technology-infused Learning Environments in Higher Education. 3 Credits.
This course will prepare current and future college-level instructors to effectively infuse appropriate technology tools into contemporary higher education learning environments.

STEM 890. Graduate Seminar. 1-5 Credits.

STEM 893. Individual Study/Tutorial. 1-5 Credits.

Sociology (SOC)

SOC 110. Introduction to Sociology. 3 Credits.
Introductory analysis of the nature of society, the interrelationship of its component groups, and the process whereby society persists and changes.

SOC 115. Social Problems. 3 Credits.
Sociological analysis of major social problems.

SOC 116. Global Social Problems. 3 Credits.
Sociological analysis of global social problems.

SOC 179. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

SOC 194. Individual Study. 1-5 Credits.

SOC 196. Field Experience. 1-15 Credits.

SOC 199. Special Topics. 1-5 Credits.

SOC 214. Social Interaction. 3 Credits.
Examination of issues relevant to the study of individual behavior (e.g., self-concept, attitudes, social perception) in a social context. Cross-listed with PSYC 214.

SOC 233. Sociology of Organizations and Work. 3 Credits.
This course examines major types of organizations, their goals, and characteristics. The course focuses on social issues as they relate to organizations and work.

SOC 235. Cultural Diversity. 3 Credits.
Analysis of lifestyles and characteristics of racial, cultural, and ethnic groups in society. Review of processes of discrimination, prejudice, and related dehumanizing biases toward culturally diverse groups including women.

SOC 240. Gender and Popular Culture. 3 Credits.
This course introduces students to concepts in the sociology of gender and popular culture. The course offers an overview of the gendered experience of cultural production, representation, and lived lives. Students will learn how aspects of popular culture produce and reinforce our understanding of gender.

SOC 279. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

SOC 291. Seminar. 1-5 Credits.

SOC 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOC 294. Individual Study. 1-5 Credits.

SOC 298. Professional Seminar. 1 Credit.
The Professional Seminar is designed to support students in gaining the professional skills they need to support their career goals. In this professional seminar, students will build their career skills and learn more about careers in sociology. In addition, they will have the opportunity to develop their career goals and develop a plan to support those goals. Prereq: Students must be at least sophomore standing. Cross-listed with ANTH 298.

SOC 299. Special Topics. 1-5 Credits.

SOC 340. Social Research Methods. 3 Credits.
Overview of the scientific method, the philosophy of science, and the goals of science. Detailed study of qualitative and quantitative methodologies. Cross-listed with COMM 340.

SOC 341. Social Research Methods Laboratory. 1 Credit.
Laboratory to accompany SOC 340. Provides application of conceptualization, operationalization, sampling methods, qualitative and quantitative research methods, and computer statistical analysis. Cross-listed with COMM 341.

SOC 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

SOC 391. Seminar. 1-3 Credits.

SOC 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOC 394. Individual Study. 1-5 Credits.

SOC 399. Special Topics. 1-5 Credits.

SOC 401. Sociology of Religion. 3 Credits.
Study of religion viewed as a social institution with a characteristic history, ecology, structure, behavior, and purpose. Cross-listed with RELS 401. {Also offered for graduate credit - see SOC 601.}.

SOC 403. Sociology of The Great Plains. 3 Credits.
Social and cultural patterns, trends, and problems peculiar to life in the semi-arid Great Plains. {Also offered for graduate credit - see soc 603.}.

SOC 404. Community Assessment. 3 Credits.
Students work with community leaders and their towns to conduct an asset-based community assessment of the town's human, social, cultural, political, built, financial, and natural capitals. {Also offered for graduate credit - see SOC 604.}.

SOC 405. Community Development. 3 Credits.
Study of communities viewed as social systems. Includes political, economic, social, and economic factors affecting community growth and decline. Community development methods are addressed. {Also offered for graduate credit - see SOC 605.}.

SOC 407. Deviant Behavior. 3 Credits.
See Criminal Justice for description. {Also offered for graduate credit - see SOC 607.}.

SOC 410. Social Inequality. 3 Credits.
Analysis of social and economic inequities and investigation of the relationship between inequity and life chances. {Also offered for graduate credit - see SOC 610.}.

SOC 412. Sociology of Gender. 3 Credits.
This course examines the institutional norms, values, and attitudes that shape gender identity, as well as their affects on women and men's lives. {Also offered for graduate credit - see SOC 612.}.

SOC 416. Sociology Through Literature. 3 Credits.
Study of basic concepts of sociology as illustrated in selected literature from 19th and 20th century English, American, French, and Russian novels. Prereq: SOC 110.

SOC 417. Sociology of the Family. 3 Credits.
Comparative family types, member relationships, family dynamics in relation to personality, social change, and social values. {Also offered for graduate credit - see SOC 617.}.

SOC 418. Social Psychology. 3 Credits.
Examination of both historical and contemporary research and theory in social psychology: the study of the relationship between the individual and the social context. {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. {Also offered for graduate credit - see SOC 622.}.

SOC 424. Feminist Theory and Discourse. 3 Credits.
Historical overview of feminist ideas and major writings from the 18th century to the present, which includes issues related to women's personal, social, and public lives.{Also offered for graduate credit - see SOC 624.}.

SOC 425. Sociology of Culture. 3 Credits.
This course introduces students to the foundations of the sociology of culture. Building on the ideas of the Frankfurt School and Birmingham Centre, this course explores topics such as subcultures and media culture. Prereq: SOC 110 or ANTH 111. {Also offered for graduate credit - see SOC 625.}.

SOC 426. Sociology of Medicine. 3 Credits.
Analysis of the social aspects of health and illness, the health care professions, organization of health care, and related issues. {Also offered for graduate credit - see SOC 626.}.

SOC 431. Environmental Sociology. 3 Credits.
Examines the interactions between the biophysical environment and human society, how social processes define, construct, and threaten the environment, and the human causes and consequences of environmental problems and their solutions.{Also offered for graduate credit - see SOC 631.}.

SOC 439. Social Change. 3 Credits.
Analysis of the complex nature of social change in communities, the nation, and internationally. Prereq: SOC 110. {Also offered for graduate credit - see SOC 639.}.

SOC 440. Sociology of Aging. 3 Credits.
Examination of sociological perspectives on aging. Topics include social theories of aging, retirement, long-term care, chronic illness, and death.{Also offered for graduate credit - see SOC 640.}.

SOC 441. Death and Dying. 3 Credits.
Examination of research, theories, and case studies on the sociocultural dimensions of death and dying across time and societies. Topics include suicide, funerals, hospice practice, disasters, afterlife beliefs, grief, bereavement and memory, organ donation, death in popular culture, end-of-life issues, cemeteries and body disposition, euthanasia, art, film, music and literature, genocide, and war. Cross-listed with ANTH 441. {Also offered for graduate credit - see SOC 641.}.

SOC 465. Applied Demographics. 3 Credits.
Overview of demographic concepts and principles and their application to business and planning decisions. Emphasis on using databases and information sources available on the Internet. {Also offered for graduate credit - see SOC 665.}.

SOC 470. Social Data Analysis. 3 Credits.
Experience with analysis of textual data and social survey data. Investigate patterns in social variables. Testing hypotheses and discovering relationships between variables. {Also offered for graduate credit - See SOC 670.}.

SOC 476. Sociology of Education. 3 Credits.
Sociological analysis of education systems. {Also offered for graduate credit - see SOC 676.}.

SOC 489. Senior Capstone In Sociology. 1 Credit.
Synthesis of social research methods, sociological theory, and sub-discipline content material. Emphasis on integrative skills needed to interrelate the basic concepts of the discipline. Prereq: SOC 340 or Senior standing.

SOC 491. Seminar. 1-5 Credits.

SOC 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOC 494. Individual Study. 1-5 Credits.

SOC 496. Field Experience. 1-15 Credits.

SOC 499. Special Topics. 1-5 Credits.

SOC 601. Sociology of Religion. 3 Credits.
Study of religion viewed as a social institution with a characteristic history, ecology, structure, behavior, and purpose. Cross-listed with RELS 601. {Also offered for undergraduate credit - see SOC 401.}.

SOC 603. Sociology of The Great Plains. 3 Credits.
Social and cultural patterns, trends, and problems peculiar to life in the semi-arid Great Plains. {Also offered for undergraduate credit - see SOC 403.}.

SOC 604. Community Assessment. 3 Credits.
Students work with community leaders and their towns to conduct an asset-based community assessment of the town's human, social, cultural, political, built, financial, and natural capitals. {Also offered for undergraduate credit - see SOC 404.}.

SOC 605. Community Development. 3 Credits.
Study of communities viewed as social systems. Includes political, economic, social, and economic factors affecting community growth and decline. Community development methods are addressed. {Also offered for undergraduate credit - see SOC 405.}.

SOC 607. Deviant Behavior. 3 Credits.
See Criminal Justice for description. {Also offered for undergraduate credit - see SOC 407.}.

SOC 610. Social Inequality. 3 Credits.
Analysis of social and economic inequities and investigation of the relationship between inequity and life chances. {Also offered for undergraduate credit - see SOC 410.}.

SOC 612. Sociology of Gender. 3 Credits.
This course examines the institutional norms, values, and attitudes that shape gender identity, as well as their affects on women and men's lives. {Also offered for undergraduate credit - see SOC 412.}.

SOC 617. Sociology Of The Family. 3 Credits.
Comparative family types, member relationships, family dynamics in relation to personality, social change, and social values. {Also offered for undergraduate credit - see SOC 417.}.

SOC 618. Social Psychology. 3 Credits.
Examination of both historical and contemporary research and theory in social psychology: the study of the relationship between the individual and the social context. {Also offered for undergraduate credit - see SOC 418.}.

SOC 622. Development Of Social Theory. 3 Credits.
Sociological theories and systems from Comte, Marx, Durkheim, and Weber through the 20th century. {Also offered for undergraduate credit - see SOC 422.}.

SOC 624. Feminist Theory and Discourse. 3 Credits.
Historical overview of feminist ideas and major writings from the 18th century to the present, which includes issues related to women's personal, social, and public lives. {Also offered for undergraduate credit - see SOC 424.}.

SOC 625. Sociology of Culture. 3 Credits.
This course introduces students to the foundations of the sociology of culture. Building on the ideas of the Frankfurt School and Birmingham Centre, this course explores topics such as subcultures and media culture. {Also offered for undergraduate credit - see SOC 425.}.

SOC 626. Sociology of Medicine. 3 Credits.
Analysis of the social aspects of health and illness, the health care professions, organization of health care, and related issues. {Also offered for undergraduate credit - see SOC 426.}.

SOC 631. Environmental Sociology. 3 Credits.
Examines the interactions between the biophysical environment and human society, how social processes define, construct, and threaten the environment, and the human causes and consequences of environmental problems and their solutions. {Also offered for undergraduate credit - see SOC 431.}.

SOC 639. Social Change. 3 Credits.
Analysis of the complex nature of social change in communities, the nation, and internationally. {Also offered for undergraduate credit - see SOC 439.}.

SOC 640. Sociology Of Aging. 3 Credits.
Examination of sociological perspectives on aging. Topics include social theories of aging, retirement, long-term care, chronic illness, and death. {Also offered for undergraduate credit - see SOC 440.}.

SOC 641. Death and Dying. 3 Credits.
Examination of research, theories, and case studies on the sociocultural dimensions of death and dying across time and societies. Topics include suicide, funerals, hospice practice, disasters, afterlife beliefs, grief, bereavement and memory, organ donation, death in popular culture, end-of-life issues, cemeteries and body disposition, euthanasia, art, film, music and literature, genocide, and war. Cross-listed with ANTH 641. {Also offered for undergraduate credit - see SOC 441.}.

SOC 665. Applied Demographics. 3 Credits.
Overview of demographic concepts and principles and their application to business and planning decisions. Emphasis on using databases and information sources available on the Internet. {Also offered for undergraduate credit - see SOC 465.}.

SOC 670. Social Data Analysis. 3 Credits.
Experience with analysis of textual data and social survey data. Investigate patterns in social variables. Testing hypotheses and discovering relationships between variables. {Also offered for undergraduate credit - See SOC 470.}.

SOC 676. Sociology of Education. 3 Credits.
Sociological analysis of education systems. {Also offered for undergraduate credit - see SOC 476.}.

SOC 690. Graduate Seminar. 1-3 Credits.

SOC 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOC 695. Field Experience. 1-15 Credits.

SOC 696. Special Topics. 1-5 Credits.

SOC 700. Qualitative Methods. 3 Credits.
Advanced analysis of the methods used in qualitative research projects such as intensive interviewing, focus groups, and participant observation.

SOC 701. Quantitative Methods. 3 Credits.
Advanced analysis of the methods used in quantitative research projects, such as survey design, experimental design, and evaluation research.

SOC 723. Social Theory. 3 Credits.
Examination of contemporary social theories and theory construction. Prereq: SOC 622.

SOC 733. Organizations and the State. 3 Credits.
This course tackles the complex set of historical, economic, political and sociological issues that affect embedded organizations. Students will learn applications of game and exchange theory models that will provide mechanistic explanations of power dynamics within and between organizations.

SOC 790. Graduate Seminar. 1-3 Credits.

SOC 791. Temporary/Trial Topics. 1-5 Credits.

SOC 793. Individual Study/Tutorial. 1-5 Credits.

SOC 794. Practicum/Internship. 1-8 Credits.

SOC 795. Field Experience. 1-15 Credits.

SOC 796. Special Topics. 1-5 Credits.

SOC 797. Master's Paper. 1-3 Credits.

SOC 798. Master's Thesis. 1-10 Credits.

SOC 799. Master's Examination. 1-6 Credits.

SOC 898. Continuing Enrollment. 1-9 Credits.
For graduate students who have completed all necessary credits of course work including thesis (798) and dissertation (899) on their approved Plan of Study, but who have not yet completed and submitted their thesis or dissertation. This course does not count towards the credit requirements for the degree and is not financial aid eligible. Department consent required to enroll.

Soil Science (SOIL)

SOIL 194. Individual Study. 1-5 Credits.

SOIL 196. Field Experience. 1-15 Credits.

SOIL 199. Special Topics. 1-5 Credits.

SOIL 210. Introduction to Soil Science. 3 Credits.
This is a 3-credit introductory-level course that will cover the basic principles of soil science. Topics will include the concepts of soil as a natural body, composition of soil, functions of soil, soil formation and classification, physical/chemical/biological properties of soils, and soil management and conservation. Lecture periods will consist of a combination of material presentation and designated time for applied learning activities.

SOIL 217. Introduction to Meteorology & Climatology. 3 Credits.
Basic meteorology-climatology concepts and their application; includes energy balance, greenhouse effect, temperature, pressure systems, lows, highs, fronts, winds, clouds, storms, humidity, precipitation, and measurements. Lectures, discussions, demonstrations. S.

SOIL 264. Natural Resource Management Systems. 3 Credits.
General principles of natural resource management, including soil and water conservation, soil and wind erosion, use of tillage and vegetation for conservation, drainage, irrigation, and soil and water quality. 3 lectures. Prereq: MATH 103, MATH 104 or MATH 107. Cross-listed with ASM 264 and NRM 264.

SOIL 291. Seminar. 1-5 Credits.

SOIL 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOIL 294. Individual Study. 1-5 Credits.

SOIL 299. Special Topics. 1-5 Credits.

SOIL 322. Soil Fertility and Fertilizers. 3 Credits.
Principles of plant nutrition and soil nutrient availability; soil testing and fertilizer recommendations and management. Macronutrient emphasis. 2 lectures, 1 two-hour laboratory. Prereq: SOIL 210, CHEM 121, CHEM 121L. S.

SOIL 351. Soil Ecology. 3 Credits.
Principles of soil-plant-animal interactions and their influences on environmental and agricultural issues of global significance (e.g. sustainable agriculture, global climate change, diversity conservation. Prereq: SOIL 210.

SOIL 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

SOIL 391. Seminar. 1-5 Credits.

SOIL 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOIL 394. Individual Study. 1-5 Credits.

SOIL 397. Fe/Coop Ed/Internship. 1-4 Credits.

SOIL 399. Special Topics. 1-5 Credits.

SOIL 410. Soils and Land Use. 3 Credits.
Principles of chemistry, physics and biology will be used to determine the effects of soil management, agrichemical usage, livestock production, and vegetation on the environment using scales ranging from microsite to watershed. Prereq: SOIL 210, CHEM 121, CHEM 121L.{Also offered for graduate credit - see SOIL 610.}.

SOIL 433. Soil Ecohydrology and Physics. 3 Credits.
Introduction of the fate and transport of water, heat, and solutes in soils of natural ecosystems and agricultural landscapes with focus on the physical characteristics of soil, fluxes across interfaces, and prediction of flows within and across the vadose zone and the critical zone. Application of concepts and predictions to real-world scenarios and case studies. Prereq: SOIL 210, PHYS 211. {Also offered for graduate credit - see SOIL 633.}.

SOIL 444. Soil Genesis and Survey. 3 Credits.
Introduction to soil genesis, morphology, geography and soil survey, 2 lectures, 1 four-hour laboratory (first 10 weeks only) focuses on soil description and properties in situ. Prereq: SOIL 210. F {Also offered for graduate credit - see SOIL 644.}.

SOIL 447. Microclimatology. 3 Credits.
Characteristics and causes of the climate near the ground and its interaction with living organisms. Energy and mass transfer concepts. Lectures, discussions, demonstrations, field trips. Prereq: PHYS 211. F (odd years) {Also offered for graduate credit - see SOIL 647.}.

SOIL 452. Managing Natural and Rangeland Resources using GIS. 3 Credits.
The application of Geographic Information Systems to managing natural and rangeland resources will be investigated. Different natural and rangeland resource datasets, analysis methods, and software packages will be utilized. Cross-listed with NRM 452 and RNG 452. Dual-listing: SOIL 652.

SOIL 454. Wetland Resources Management. 3 Credits.
Principles of wetland systems, wetland management, wetland functions, wetland delineation, wetland assessment, and wetland improvement. Prereq: SOIL 210. Cross-listed with NRM 454 and RNG 454. F (even years) {Also offered for graduate credit - see SOIL 654.}.

SOIL 456. Ecological Restoration. 3 Credits.
This course reviews ecological concepts inherent to ecosystem structure and function, including plant, soil, and animal ecology, and ecosystem response to disturbance. Furthermore, the course will illustrate how this ecological knowledge is used along with socioeconomic information to develop and implement effective restoration projects in both terrestrial and aquatic ecosystems. Cross-listed with NRM 456 and RNG 456. Dual-listing: RNG 656, NRM 656 and SOIL 656.

SOIL 462. Natural Resource and Rangeland Planning. 3 Credits.
Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Prereq: at least senior standing and must be a Natural Resources Management, Range Science or Soil Science major. Cross-listed with NRM and RNG. {Also offered for graduate credit - see SOIL 662.}.

SOIL 465. Soil And Plant Analysis. 3 Credits.
Laboratory analysis of soil, plant, and environmental materials for constituent elements. 2 lectures, 1 laboratory. Prereq: SOIL 210, CHEM 121, CHEM 122. S (odd years) {Also offered for graduate credit - see SOIL 665.}.

SOIL 491. Seminar. 1-5 Credits.

SOIL 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOIL 494. Individual Study. 1-5 Credits.

SOIL 496. Field Experience. 1-15 Credits.

SOIL 499. Special Topics. 1-5 Credits.

SOIL 610. Soils and Land Use. 3 Credits.
Principles of chemistry, physics and biology will be used to determine the effects of soil management, agrichemical usage, livestock production, and vegetation on the environment using scales ranging from microsite to watershed. {Also offered for undergraduate credit - see SOIL 410.}.

SOIL 633. Soil Ecohydrology and Physics. 3 Credits.
Introduction of the fate and transport of water, heat, and solutes in soils of natural ecosystems and agricultural landscapes with focus on the physical characteristics of soil, fluxes across interfaces, and prediction of flows within and across the vadose zone and the critical zone. Application of concepts and predictions to real-world scenarios and case studies. {Also offered for undergraduate credit - see SOIL 433.}.

SOIL 644. Soil Genesis and Survey. 3 Credits.
Introduction to soil genesis, morphology, geography and soil survey, 2 lectures, 1 four-hour laboratory (first 10 weeks only) focuses on soil description and properties in situ. F {Also offered for undergraduate credit - see SOIL 444.}.

SOIL 647. Microclimatology. 3 Credits.
Characteristics and causes of the climate near the ground and its interaction with living organisms. Energy and mass transfer concepts. Lectures, discussions, demonstrations, field trips. F (odd years) {Also offered for undergraduate credit - see SOIL 447.}.

SOIL 652. Managing Natural and Rangeland Resources using GIS. 3 Credits.
The application of Geographic Information Systems to managing natural and rangeland resources will be investigated. Different natural and rangeland resource datasets, analysis methods, and software packages will be utilized. Cross-listed with NRM 652 and RNG 652. Dual-listing: SOIL 452.

SOIL 654. Wetland Resources Management. 3 Credits.
Principles of wetland systems, wetland management, wetland functions, wetland delineation, wetland assessment, and wetland improvement. Cross-listed with NRM 654 and RNG 654. F (even years) {Also offered for undergraduate credit - see SOIL 454.}.

SOIL 656. Ecological Restoration. 3 Credits.
This course reviews ecological concepts inherent to ecosystem structure and function, including plant, soil, and animal ecology, and ecosystem response to disturbance. Furthermore, the course will illustrate how this ecological knowledge is used along with socioeconomic information to develop and implement effective restoration projects in both terrestrial and aquatic ecosystems. Cross-listed with RNG 656 and NRM 656. Dual-listing: SOIL 456.

SOIL 662. Natural Resource and Rangeland Planning. 3 Credits.
Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Cross-listed with NRM and RNG. {Also offered for undergraduate credit - see SOIL 462.}.

SOIL 665. Soil And Plant Analysis. 3 Credits.
Laboratory analysis of soil, plant, and environmental materials for constituent elements. 2 lectures, 1 laboratory. S (odd years.) {Also offered for undergraduate credit - see SOIL 465.}.

SOIL 690. Graduate Seminar. 1-3 Credits.

SOIL 695. Field Experience. 1-15 Credits.

SOIL 696. Special Topics. 1-5 Credits.

SOIL 721. Environmental Field Instrumentation and Sampling. 2 Credits.
To provide an overview of the tools (manual and electronic) concepts, and theories used to sample for physical, chemical, and biological parameters. F (odd years) (Two one-hour lectures and one four-hour laboratory per week.).

SOIL 733. Advanced Soil Nutrient Cycling. 3 Credits.
Overview of origins, nature, fate, and measurements of organic matter in soils, with specific focus on microbially-mediated, physical, and chemical processing of carbon, nitrogen, phosphorus, and other plant nutrients. Three lectures per week. Offered spring semester, even years.

SOIL 755. Soil Chemistry. 3 Credits.
Chemical reactions and equilibria, solubility relationships, mineral weathering, cation and anion adsorption, redox reactions, metal chelation, and fixation of nutrients in the soil. 3 lectures. F.

SOIL 763. Advanced Soil Hydrology and Physics. 3 Credits.
Theory of the fate and transport of water, heat, and solutes in soils with focus on analytical and numerical modeling across scales of individual pores, soil horizons, the vadose zone, and the critical zone. Prereq: SOIL 633.

SOIL 782. Precision Agriculture Principles for Nutrient Management. 3 Credits.
Advanced study of soil-plant-nutrient relationships with emphasis on precision agricultural concepts. 3 lectures.

SOIL 790. Graduate Seminar. 1-3 Credits.

SOIL 791. Temporary/Trial Topics. 1-5 Credits.

SOIL 792. Graduate Teaching Experience. 1-6 Credits.

SOIL 793. Individual Study/Tutorial. 1-5 Credits.

SOIL 794. Practicum/Teaching. 1-8 Credits.

SOIL 795. Field Experience. 1-15 Credits.

SOIL 796. Special Topics. 1-5 Credits.

SOIL 797. Master's Paper. 1-3 Credits.

SOIL 798. Master's Thesis. 1-10 Credits.

SOIL 892. Graduate Teaching Experience. 1-6 Credits.

SOIL 893. Individual Study. 1-5 Credits.

SOIL 899. Doctoral Dissertation. 1-15 Credits.

Spanish (SPAN)

SPAN 101. First-Year Spanish I. 4 Credits.
Basic structures and vocabulary of Spanish. Practice in the fundamentals of listening, speaking, reading, and writing. No previous knowledge of Spanish required.

SPAN 102. First-Year Spanish II. 4 Credits.
Basic structures and vocabulary of Spanish. Practice in the fundamentals of listening, speaking, reading, and writing. Prereq: SPAN 101.

SPAN 194. Individual Study. 1-3 Credits.

SPAN 196. Field Experience. 1-15 Credits.

SPAN 199. Special Topics. 1-5 Credits.

SPAN 201. Second-Year Spanish I. 3 Credits.
Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary readings. Prereq: SPAN 102.

SPAN 202. Second-Year Spanish II. 3 Credits.
Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary readings. Prereq: SPAN 201.

SPAN 279. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

SPAN 291. Seminar. 1-5 Credits.

SPAN 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SPAN 294. Individual Study. 1-5 Credits.

SPAN 299. Special Topics. 1-5 Credits.

SPAN 301. Spanish for Business. 3 Credits.
Advanced Spanish practice to develop greater proficiency in oral, reading, listening, and written skills in Spanish through the study of the Spanish-speaking business world and beyond. Prereq: SPAN 202 or equivalent.

SPAN 303. Spanish for Health Care. 2 Credits.
Practice to develop proficiency in Spanish speaking, listening, reading, and writing skills and cultural knowledge for the Spanish-speaking health care environment.

SPAN 311. Spanish Conversation and Composition I. 3 Credits.
Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: SPAN 202.

SPAN 312. Spanish Conversation and Composition II. 3 Credits.
Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: SPAN 202.

SPAN 330. Introduction to Spanish Civilization. 3 Credits.
Introduction to the social, political and cultural history of Spain. Taught in Spanish. Prereq: SPAN 312.

SPAN 331. Introduction to Spanish American Civilization. 3 Credits.
Introduction to the social, political and cultural history of the Spanish-speaking Americas. Taught in Spanish. Prereq: SPAN 312.

SPAN 332. Introduction to Hispanic Cinema. 3 Credits.
Study of film genres, styles, or movements, focusing on aesthetic conventions, cultural context, socio-historical significance and critical approaches. Prereq: SPAN 312.

SPAN 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

SPAN 391. Seminar. 1-5 Credits.

SPAN 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SPAN 393. Undergraduate Research. 1-5 Credits.

SPAN 394. Individual Study. 1-5 Credits.

SPAN 399. Special Topics. 1-5 Credits.

SPAN 401. Advanced Spanish Grammar and Writing. 3 Credits.
Writing practice with primary focus on form, syntax, and style. Taught in Spanish. Prereq: SPAN 312.

SPAN 402. Advanced Spanish Conversation. 3 Credits.
Advanced practice to develop greater oral proficiency through the analysis and discussion of cultural and literary texts. Prereq: SPAN 312.

SPAN 403. Advanced Spanish for Health Care. 1 Credit.
Advanced practice to develop greater proficiency in Spanish speaking, reading, listening, and writing skills and cultural knowledge for the Spanish-speaking health care environment. If you have not taken the required prerequisite/corequisite but feel you are qualified to take this course because of previous language study or experience, please see the course instructor or department chair to enroll. Prereq or Co-req: SPAN 311.

SPAN 430. Approaches to Literature. 3 Credits.
Emphasis on critical analysis of Spanish-language literary texts from a variety of theoretical perspectives so that students will develop the technical vocabulary necessary to discuss literary texts in Spanish and grasp levels of meaning in the literature. Taught in Spanish. Prereq: SPAN 312.

SPAN 440. Traditions in Spanish American Literature. 3 Credits.
Representative works from the pre-conquest era to the 21st century. Overview of literary movements, genres, and cultural background. Taught in Spanish. Prereq: SPAN 312. Formerly SPAN 411.

SPAN 441. Contemporary Spanish American Literature. 3 Credits.
Developments and techniques in contemporary texts through representative works. Overview of cultural, historical, and socio-political aspects, as well as literary background. Taught in Spanish. Prereq: SPAN 312. Formerly SPAN 412.

SPAN 442. Introduction to Chicano Literature. 3 Credits.
Study of Chicano Literature, from the 19th century "californios" through the Chicano Renaissance to recent work by Chicana writers. Taught in Spanish. Prereq: SPAN 312 plus 6 additional upper-division credits. {Also offered for graduate credit - see SPAN 642.}.

SPAN 443. Spanish American Women Writers. 3 Credits.
Developments and techniques in major texts by Spanish American women writers through representative works. Overview of cultural, historical and socio-political aspects, as well as literary background and criticism. Taught in Spanish. Prereq: SPAN 312.

SPAN 450. Traditions in Spanish Literature. 3 Credits.
Representative works of the literature of Spain from its epic beginnings to the contemporary period. Overview of literary movements, genres, and cultural background. Taught in Spanish. Prereq: SPAN 312. Formerly SPAN 410.

SPAN 451. Contemporary Spanish Literature. 3 Credits.
Representative works of the literature of Spain from modernity forward. Overview of literary movements, genres, and cultural background. Taught in Spanish. Prereq: SPAN 312.

SPAN 452. Cervantes. 3 Credits.
Study of representative works by Miguel de Cervantes, including Don Quixote. Taught in Spanish. Prereq: SPAN 312.

SPAN 453. Spanish Women Writers. 3 Credits.
Survey of representative works by women in the Spanish literary tradition. Prereq: SPAN 312.

SPAN 489. Senior Thesis. 1 Credit.
Integrative capstone experience for seniors majoring in Spanish; faculty guided research within the context of a 400-level literature or culture course leading to a substantive written project in Spanish and oral presentation to faculty and departmental majors. Prereq: Senior standing, study abroad.

SPAN 491. Seminar. 1-5 Credits.

SPAN 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SPAN 494. Individual Study. 1-5 Credits.

SPAN 496. Field Experience. 1-15 Credits.

SPAN 499. Special Topics. 1-5 Credits.

SPAN 642. Introduction to Chicano Literature. 3 Credits.
Study of Chicano Literature, from the 19th century "californios" through the Chicano Renaissance to recent work by Chicana writers. Taught in Spanish. {Also offered for undergraduate credit - see SPAN 442.}.

SPAN 690. Graduate Seminar. 1-5 Credits.

Sport Management (SPMT)

Statistics (STAT)

STAT 194. Individual Study. 1-5 Credits.

STAT 196. Field Experience. 1-15 Credits.

STAT 199. Special Topics. 1-5 Credits.

STAT 291. Seminar. 1-5 Credits.

STAT 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

STAT 294. Individual Study. 1-5 Credits.

STAT 299. Special Topics. 1-5 Credits.

STAT 330. Introductory Statistics. 3 Credits.
Frequency tables, histograms, probability, well-known probability distributions, one and two sample tests of hypotheses, confidence intervals, and contingency tables. Prereq: Math placement into MATH 103, MATH 104, MATH 105, MATH 107, MATH 146 or MATH 165.

STAT 331. Regression Analysis. 2 Credits.
Simple and multiple regression techniques and correlation coefficients. Extensive use of SAS. Emphasis on applications. Prereq: STAT 330.

STAT 367. Probability. 3 Credits.
Probability, probability distributions for discrete random variables, probability density functions, marginal joint probability density functions, expected value and variance, and transformations. Prereq: MATH 166.

STAT 368. Statistics. 3 Credits.
Moments, moment generating functions, central limit theorem, one and two sample tests of hypotheses, estimation, and simple linear regression and correlation. Prereq: STAT 367.

STAT 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

STAT 391. Seminar. 1-5 Credits.

STAT 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

STAT 394. Individual Study. 1-5 Credits.

STAT 399. Special Topics. 1-5 Credits.

STAT 412. Statistics for Data Science using R. 3 Credits.
This course introduces the statistics for data science: Basic principles of statistics for Data Science; R programming; Exploratory Data Analysis; Data and Sampling Distributions; Statistical Experiments and Testing; Regression and Prediction; Classification; Basic Statistical Machine Learning; Unsupervised Learning. Prereq: STAT 330.

STAT 450. Stochastic Processes. 3 Credits.
Discrete time Markov chains, Poisson processes, continuous time Markov chains, birth and death processes, renewal processes, branching processes, queuing systems, and applications. Prereq: STAT 368. {Also offered for graduate credit - see STAT 650.}.

STAT 460. Applied Survey Sampling. 3 Credits.
Simple random, stratified, systematic and cluster sampling; two-stage sampling. Estimation of population means and variances. Ratio and regression estimators. Prereq: STAT 330 or STAT 368. {Also offered for graduate credit - see STAT 660.}.

STAT 461. Applied Regression Models. 3 Credits.
Simple linear regression, matrix approach to multiple regression, and introduction to various tests and confidence intervals. Includes discussion of multicollinearity and transformations. Prereq: MATH 128 or MATH 129, MATH 165, STAT 330 or STAT 368. {Also offered for graduate credit - see STAT 661.}.

STAT 462. Introduction to Experimental Design. 3 Credits.
Fundamental principles of designing an experiment, randomized block, Latin square, and factorial. Also covers analysis of covariance and response surface methodology. The class is designated as an undergraduate capstone course. Prereq: STAT 331 or STAT 461 and senior standing. {Also offered for graduate credit - see STAT 662.}.

STAT 463. Nonparametric Statistics. 3 Credits.
Various tests and confidence intervals that may be used when the underlying probability distributions are unknown. Includes the Wilcoxon, Kruskal-Wallis, and Friedman. Prereq: STAT 330 or STAT 368 {Also offered for graduate credit - see STAT 663.}.

STAT 464. Discrete Data Analysis. 3 Credits.
Application of binomial, hypergeometric, Poisson, mixed Poisson, and multinomial distributions in discrete data analysis. Log-linear models and contingency tables. Logistic regression. Discrete discriminant analysis. Prereq: STAT 367. {Also offered for graduate credit - see STAT 664.}.

STAT 465. Meta-Analysis Methods. 3 Credits.
Statistical methods for meta-analysis with applications. Various parametric effect size from a series of experiments: fixed effect, random effect linear models; combining estimates of correlation coefficients; meta-analysis in the physical and biological sciences. Prereq: STAT 331, STAT 461, or STAT 725. {Also offered for graduate credit - see STAT 665.}.

STAT 467. Probability and Mathematical Statistics I. 3 Credits.
Random variables, discrete probability distributions, density functions, joint and marginal density functions, transformations, limiting distributions, central limit theorem. Prereq: MATH 265 or STAT 368.

STAT 468. Probability and Mathematical Statistics II. 3 Credits.
Properties of estimators, confidence intervals, hypotheses testing, Neyman-Pearson lemma, likelihood ratio tests, complete and sufficient statistics. Prereq: STAT 467.

STAT 469. Introduction to Biostatistics. 3 Credits.
Introduction to biostatistical concepts and reasoning. Inference on means and proportion; Hypothesis testing; Group comparisons; Nonparametric methods; Sample size estimation; Contingency table; Simple and multiple regression; Logistic regression. Prereq: STAT 330. {Also offered for graduate credit - see STAT 669.}.

STAT 470. Statistical SAS Programming. 3 Credits.
Focuses on statistical problem solving and writing SAS computer code. Data types, data management, data input/output, SAS as a programming language, data analysis, report writing, and graphing. Prereq: STAT 461 or STAT 462. {Also offered for graduate credit - see STAT 670.}.

STAT 471. Introduction to the R Language. 3 Credits.
R commands, expressions, functions, and matrix operations. Elements of programming and graphics in R. Statistical problem solving with R: linear regression, experimental design. Knowledge of matrix algebra and inferential statistics is expected. Prereq: STAT 330 or STAT 368; MATH 128 or MATH 129. {Also offered for graduate credit - see STAT 671.}.

STAT 472. Time Series. 3 Credits.
Estimation of trend in time series data; seasonal models; stationary models; moving average, autoregressive, and ARMA models; model identification; forecasting; and intervention analysis. Prereq: STAT 468, STAT 461, course in matrix algebra. {Also offered for graduate credit - see STAT 672.}.

STAT 473. Actuarial Statistical Risk Analysis. 3 Credits.
Individual and collective actuarial risk models for claim random variables with applications in risk and survival analysis. Basics of interest theory and utility theory are also covered. The course is intended to prepare students for taking SOA/CAS Exam-2. Prereq: STAT 367 or STAT 467. {Also offered for graduate credit - see STAT 673.}.

STAT 476. Actuary Exam Study. 1 Credit.
Selected material from probability and mathematical statistics in preparation for the national actuarial exam. Prereq: STAT 368 or STAT 468. Cross-listed with MATH.

STAT 477. Introductory Survival and Risk Analysis I. 3 Credits.
Survival distributions, life tables, and various risk models, intended to prepare students for taking higher level actuarial exams: SOA1 Course FM/CAS2 Exam 2 and SOA Course MLC/CAS Exam 3L. Prereq: STAT 367 or STAT 467. {Also offered for graduate credit - see STAT 677 .}.

STAT 478. Introductory Survival & Risk Analysis II. 3 Credits.
Distribution of the random variable- the time until future of a joint-life status, life tables, competing risks and multiple decrement probabilities, Markov chain and Poisson models, 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. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

STAT 494. Individual Study. 1-5 Credits.

STAT 496. Field Experience. 1-15 Credits.

STAT 499. Special Topics. 1-5 Credits.

STAT 650. Stochastic Processes. 3 Credits.
Discrete time Markov chains, Poisson processes, continuous time Markov chains, birth and death processes, renewal processes, branching processes, queuing systems, and applications. {Also offered for undergraduate credit - see STAT 450.}.

STAT 660. Applied Survey Sampling. 3 Credits.
Simple random, stratified, systematic and cluster sampling; two-stage sampling. Estimation of population means and variances. Ratio and regression estimators. Dual-listing: STAT 460.

STAT 661. Applied Regression Models. 3 Credits.
Simple linear regression, matrix approach to multiple regression, and introduction to various tests and confidence intervals. Includes discussion of multicollinearity and transformations. Knowledge of matrix algebra and knowledge of differential calculus is expected. {Also offered for undergraduate credit - see STAT 461.}.

STAT 662. Introduction to Experimental Design. 3 Credits.
Fundamental principles of designing an experiment, randomized block, Latin square, and factorial. Also covers analysis of covariance and response surface methodology. Knowledge of inferential statistics and regression analysis is expected. Dual-listing: STAT 462.

STAT 663. Nonparametric Statistics. 3 Credits.
Various tests and confidence intervals that may be used when the underlying probability distributions are unknown. Includes the Wilcoxon, Kruskal-Wallis, and Friedman. {Also offered for undergraduate credit - see STAT 483.}.

STAT 664. Discrete Data Analysis. 3 Credits.
Application of binomial, hypergeometric, Poisson, mixed Poisson, and multinomial distributions in discrete data analysis. Log-linear models and contingency tables. Logistic regression. Discrete discriminant analysis. {Also offered for undergraduate credit - see STAT 464.}.

STAT 665. Meta-Analysis Methods. 3 Credits.
Statistical methods for meta-analysis with applications. Various parametric effect size from a series of experiments: fixed effect, random effect linear models; combining estimates of correlation coefficients; meta-analysis in the physical and biological sciences. Prereq: STAT 661 or STAT 725. {Also offered for undergraduate credit - see STAT 465.}.

STAT 669. Introduction to Biostatistics. 3 Credits.
Introduction to biostatistical concepts and reasoning. Inference on means and proportion; Hypothesis testing; Group comparisons; Nonparametric methods; Sample size estimation; Contingency table; Simple and multiple regression; Logistic regression. {Also offered for undergraduate credit - see STAT 469.}.

STAT 670. Statistical SAS Programming. 3 Credits.
Focuses on statistical problem solving and writing SAS computer code. Data types, data management, data input/output, SAS as a programming language, data analysis, report writing, and graphing. Prereq: STAT 661 or STAT 662. {Also offered for undergraduate credit - see STAT 470.}.

STAT 671. Introduction to the R Language. 3 Credits.
R commands, expressions, functions, and matrix operations. Elements of programming and graphics in R. Statistical problem solving with R: linear regression, experimental design. Knowledge of matrix algebra and inferential statistics is expected. {Also offered for undergraduate credit - see STAT 471.}.

STAT 672. Time Series. 3 Credits.
Estimation of trend in time series data; seasonal models; stationary models; moving average, autoregressive, and ARMA models; model identification; forecasting; and intervention analysis. Prereq: STAT 768, STAT 661, course in matrix algebra. {Also offered for undergraduate credit - see STAT 472.}.

STAT 673. Actuarial Statistical Risk Analysis. 3 Credits.
Individual and collective actuarial risk models for claim random variables with applications in risk and survival analysis. Basics of interest theory and utility theory are also covered. The course is intended to prepare students for taking SOA/CAS Exam-2. {Also offered for undergraduate credit - See STAT 473.}.

STAT 677. Introductory Survival and Risk Analysis I. 3 Credits.
Survival distributions, life tables, and various risk models, intended to prepare students for taking higher level actuarial exams: SOA1 Course FM/CAS2 Exam 2 and SOA Course MLC/CAS Exam 3L. {Also offered for undergraduate credit - see STAT 477.}.

STAT 678. Introductory Survival and Risk Analysis II. 3 Credits.
Distribution of the random variable- the time until 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 677. {Also offered for undergraduate credit - see STAT 478.}.

STAT 690. Graduate Seminar. 1-3 Credits.

STAT 696. Special Topics. 1-5 Credits.

STAT 711. Basic Computational Statistics using R. 3 Credits.
Basic Statistics, General R, Data Manipulation, Basic Statistical Programming Skills, Simple Linear Regression, Classical Testing, and Categorical Data Analysis. Prereq or Coreq: This course is designed for the certificate degree in Big Data Applied Statistics Analysis and it may not be used toward any other statistics degree. Cross-listed with DATA 711.

STAT 712. Applied Statistical Machine Learning. 3 Credits.
This course provides several fundamental concepts and methods in statistical machine learning and big data analysis: divide and conquer, parallel computing in R, linear method for regression, lasso, linear method for classification, logistic regression, KNN, model selection and assessment, regression tree, classification tree, bagging, random forest, boosting, support vector machine, neural networks, K-means clustering, principal components analysis. We use R to implement all the methods in this course. NOTE: It cannot be taken as credit towards M.S. in Applied Statistics or the Ph.D. degree or the Graduate Certificate in Statistics, but may be taken as credit for the Big Data Statistical Analysis Graduate Certificate. This course is also part of the M.S. degree program in Data Science. Cross-listed with DATA 712.

STAT 713. Introduction to Data Science. 3 Credits.
Large Scale Data Manipulation, Data Management, Big Data Construction using Probabilistic and Machine Learning Data Linkage, Web Crawling, Parallel Statistical Computing, and Transferring Data Between Statistical Software. Prereq: STAT 711 or DATA 711. Prereq or Coreq: This course is designed for the certificate degree in Big Data Applied Statistics Analysis and it may not be used toward any other statistics degree. Cross-listed with DATA 713.

STAT 714. Statistical Big Data Visualization. 3 Credits.
This course is designed to equip students with the theoretical and practical tools needed to build effective and engaging data visualizations and demonstrate competence in designing and developing visual stories with data. Students will learn visual representation methods and techniques that improve their understanding of complex data and models, with emphasis placed on the identification of patterns, trends, and differences from data sets across categories, space, and time using R, PowerBI, and Tableau. NOTE: It cannot be taken as credit towards M.S. in Applied Statistics or the Ph.D. degree or the Graduate Certificate in Statistics, but may be taken as credit for the Big Data Statistical Analysis Graduate Certificate. This course is also part of the M.S. degree program in Data Science. Prereq: STAT 711. Dual-listing: DATA 714.

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. This course is not intended for statistics or mathematics majors. Cross-listed with DATA 725.

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 or DATA 725. Cross-listed with DATA 726.

STAT 730. Biostatistics. 3 Credits.
Logit model, bioessays, clinical trials, designs, and sequential estimation methods. Prereq: STAT 661 and STAT 768.

STAT 732. Introduction to Bioinformatics. 3 Credits.
An introduction to the principles of bioinformatics including information relating to the determination of DNA sequencing. Prereq: STAT 661. Cross-listed with CSCI 732 and MATH 732.

STAT 761. Advanced Regression. 3 Credits.
Multiple regression, analysis of residuals, model building, regression diagnostics, multicollinearity, robust regression, and nonlinear regression. Prereq: STAT 661.

STAT 764. Multivariate Methods. 3 Credits.
Sample geometry; correlation; multiple, partial, canonical correlation test of hypothesis on means; multivariate analysis of variance; principal components; factor analysis; and discriminant analysis. Prereq: STAT 661.

STAT 767. Probability and Mathematical Statistics I. 3 Credits.
Random variables, discrete probability distributions, density functions, joint and marginal density functions, transformations, limiting distributions, central limit theorem. Additional project required.

STAT 768. Probability and Mathematical Statistics II. 3 Credits.
Properties of estimators, confidence intervals, hypotheses testing, Neyman-Pearson lemma, likelihood ratio tests, complete and sufficient statistics. Additional projects required. Prereq: STAT 767.

STAT 770. Survival Analysis. 3 Credits.
Basic methodology in the analysis of Censored Data, two basic types of censoring, parametric estimation, nonparametric estimation, and life table methods. Prereq: STAT 768.

STAT 772. Computational Statistics. 3 Credits.
Assortment of computational statistics and statistical computing techniques. Specific topics include: random variable generation, optimization and root finding, resampling statistics, Monte Carlo methods, statistical graphics, non-linear and generalized least squares, and the EM algorithm. Prereq: STAT 661 and STAT 768.

STAT 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 790. Graduate Seminar. 1-3 Credits.

STAT 791. Temporary/Trial Topics. 1-5 Credits.

STAT 793. Individual Study/Tutorial. 1-5 Credits.

STAT 794. Practicum/Internship. 1-15 Credits.

STAT 795. Field Experience. 1-15 Credits.

STAT 796. Special Topics. 1-5 Credits.

STAT 797. Master's Paper. 1-3 Credits.

STAT 798. Master's Thesis. 1-10 Credits.

STAT 840. Introduction to Statistical Design and Analysis of Gene Expression Experiments. 3 Credits.
Introduction to microarray and next generation sequencing technologies; design of gene expression experiments; normalization methods; methods for identifying differentially expressed genes; multiple testing and false discovery rate; gene category analysis.Prereq: STAT 661, STAT 662. Prereq or Co-req: STAT 671.

STAT 851. Bayesian Statistical Inference. 3 Credits.
Bayesian approach to statistics inference including model estimation and hypothesis test. The topic covers prior and posterior, Bayes estimate, credible interval, risk, Bayes factor, hypothesis testing, Bayesian hierarchical models, and Bayes computational methods. Prereq: STAT 768.

STAT 852. Longitudinal Data Analysis. 3 Credits.
To introduce students to statistical models and methods for the analysis of the longitudinal data, i.e. data collected repeatedly on experimental units over time. The topic covers repeated measurements; event history studies; linear and nonlinear mixed effects models; marginal mean and rate models; joint analysis of longitudinal and survival data. Prereq: STAT 661, STAT 768.

STAT 859. Applied Spatial Statistics. 3 Credits.
Elementary statistical analysis of spatial data are covered. The course is repeatable for credit on a non-standard basis. Prereq: STAT 661, STAT 764 and STAT 768. Co-req: STAT 671.

STAT 860. Statistical Machine Learning. 3 Credits.
This course provides several fundamental concepts and methods in statistical machine learning: linear method for regression, linear method for classification, KNN, regression tree, classification tree, bagging, random forest, boosting, support vector machine, neural networks, K-means clustering. Prereq: STAT 661, STAT 671 and STAT 768.

STAT 874. Generalized Linear Models. 3 Credits.
This course introduces the statistical theory and inference of generalized linear models (GLMs) which deals the cases that the normality of response data is in absence. The course starts from a review of linear regression with matrix approach. The topic includes exponential distribution family, link functions, contingency tables, GLMs, quasi-GLMs, deviance, residuals, model selection and diagnostics. Students are expected to be able to apply GLMs technique to deal with real world problems in diverse areas. Prereq: STAT 768.

STAT 886. Advanced Inference. 3 Credits.
This course is aimed at providing theoretical tools in mathematical statistics and cultivating students' ability in understanding statistical research papers. Theory of point estimation and asymptotic theory will be covered. Prereq: STAT 768.

STAT 899. Doctoral Dissertation. 1-15 Credits.

Supply Chain Management (SCM)

SCM 320. Integrated Supply Chain Management. 3 Credits.
Identification of the key elements in a firm's management of their supply chain. Theory and practical applications for analyzing and developing strategies to assist firms in obtaining and maintaining a competitive advantage. Prereq: Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

SCM 325. Managing Inventory and Materials. 3 Credits.
Managing inventory and materials is the cornerstone of supply chain management. The goal of this course is two-fold: (1) identify problems and challenges in managing inventory and materials, and (2) introduce main stream quantitative methods to solve these problems and challenges. Prereq: SCM 320 and restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

SCM 330. Supply Chain Analysis and Analytics. 3 Credits.
Introduction to quantitative tools for compiling, presenting, and analyzing, numerical data to make inferences and decisions in the face of uncertainty. In addition, an understanding and application of analytics to large data. Prereq: TL 116 or CSCI 114. Prereq or Coreq: 2.50 minimum NDSU grade point average.

SCM 425. Procurement & Sourcing. 3 Credits.
This course will explain the strategic importance of procurement and sourcing on an organization's successful supply chain operations. Also, this course emphasizes the impact of purchasing on the competitive success and profitability of the firm. Prereq: SCM 320 and restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see SCM 625.}.

SCM 435. Transportation & Distribution. 3 Credits.
This course provides an overview of the management of transportation and warehouse's core fundamentals within supply chain operations. In addition, it focuses on highlighting different modes of transportation and transportation technologies required for managing the national and international supply chain. Prereq: SCM 320 and restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

SCM 450. Supplier & Customer Relations. 3 Credits.
This course provides students with a knowledge of the principles and best practices for managing and collaborating with suitable suppliers for business. Also, the course will focus on highlighting the importance of maintaining appropriate customer relationships resulting in unsolicited testimonials and relationship annuities. Students learn to integrate vendors management, business processing, and customer relationship management with a decisive strategic plan. Prereq or Coreq: Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

SCM 453. Financing the Supply Chain. 3 Credits.
The flow of financing in the supply chain is fragmented, and sensitive due to frequent fluctuations in micro and macroeconomics indicators. Therefore, this course will highlight the need and importance of financial management within supply chain operations. In addition, this course will evaluate and highlights key enablers in financing the supply chain operations and recognize some of the factors impacting their future. Prereq: SCM 320 and restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see SCM 653.}.

SCM 455. Supply Chain Technology Enablers. 3 Credits.
This course will focus on highlighting the role of emerging technologies in supply chain management. In addition, the student will be able to understand how the organization integrates its supply chain operations, procurement, and enterprise resource planning (ERP) with the usage of different technologies to optimize its efficiency and lowering operational costs. Prereq or coreq: Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

SCM 457. Scheduling in Supply Chain Management. 3 Credits.
This course will help students understand the various concepts used in planning and scheduling within supply chain operations. In addition, this will also provide insights into how the organization can incorporate and optimize its supplies, procurement, production cycle, warehouse management, and distribution efficiency by scheduling, along with cost-saving opportunities with efficient scheduling. Prereq: SCM 320 and restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

SCM 460. Production & 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: STAT 330 and MATH 144 or MATH 146. Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

SCM 462. Modeling the Supply Chain. 3 Credits.
Development of spreadsheet models representing different positions in the supply chain. The models can be used to enhance decision making and achieve a better understanding of how the different stages in a supply chain interact. Prereq: STAT 330 and at least a cumulative GPA of 2.50.

SCM 465. International Supply Chain Management. 3 Credits.
This course provides deep insights into how global trade can be facilitated through enhanced supply chain management. In addition, the course will evaluate the strategic relationships necessary for supply chain operations and the tactical activities of logistics, purchasing, and operations from a global perspective. Prereq: SCM 320 and restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average.

SCM 494. Individual Study. 1-5 Credits.

SCM 625. Procurement & Sourcing. 3 Credits.
This course will explain the strategic importance of procurement and sourcing on an organization's successful supply chain operations. Also, this course emphasizes the impact of purchasing on the competitive success and profitability of the firm. {Also offered for undergraduate credit - see SCM 425.}.

SCM 653. Financing the Supply Chain. 3 Credits.
The flow of financing in the supply chain is fragmented, and sensitive due to frequent fluctuations in micro and macroeconomics indicators. Therefore, this course will highlight the need and importance of financial management within supply chain operations. In addition, this course will evaluate and highlights key enablers in financing the supply chain operations and recognize some of the factors impacting their future. {Also offered for undergraduate credit - see SCM 453.}.

Theatre Arts (THEA)

THEA 110. Introduction to Theatre Arts. 3 Credits.
Basic orientation and historical perspective to the art of theatre. Includes the spectrum of dramatic literature, theatrical production, and performance.

THEA 115. World Film. 3 Credits.
Study of the development and practice of the art of film and its relationship to the theater emphasizing performance and production angles.

THEA 150. Theatre Foundations I. 1 Credit.
Seminar course for first year Theatre majors. Covers various topics related to resume and portfolio building. Meets once a week.

THEA 160. Storytelling. 3 Credits.
Students will explore narrative, story structure, and theatrical storytelling through creative drama and performance techniques. This class will serve as a prerequisite for the Theatre for Young Audiences Ensemble.

THEA 161. Acting I. 3 Credits.
Beginning actors are introduced to basic mental and physical performance skills, stage conventions, and scene work. Emphasis on enhancing the student's spontaneity, imagination, and awareness.

THEA 180. Dramatic Literature and Style I. 3 Credits.
Introductory survey of theatrical performance and dramatic writing from the Greeks through the eighteenth century.

THEA 181. Dramatic Literature & Style II. 3 Credits.
Survey of dramatic literature from 19th century to present, with emphasis on historical and cultural context, production style, and problems inherent in contemporary production.

THEA 194. Individual Study. 1-5 Credits.

THEA 196. Field Experience. 1-15 Credits.

THEA 199. Special Topics. 1-5 Credits.

THEA 210. Theatre Practicum. 1-2 Credits.
Participation in Theatre NDSU's production season. May be repeated for credit.

THEA 211. Stage Management Practicum and Seminar. 2 Credits.
Practical application of stage management's practices including independent study and mentorship. Students must serve as an assistant stage manager on a mainstage production to enroll in this practicum. May be repeated for credit.

THEA 220. Stagecraft Lab. 1 Credit.
Stagecraft Lab for participation inTheatre NDSU's production season by working hands-on in the scene shop to create scenery and properties. Prereq or Co-req: THEA 270.

THEA 221. Costume Craft Lab. 1 Credit.
Participation in Theatre NDSU's production season by working hands-on in the costume shop. Co-req: THEA 271.

THEA 223. Costume Design Lab. 1 Credit.
Further study and practice of costume design by participating in the preparation of costumes for the Theatre NDSU production season. Co-req: THEA 277.

THEA 224. Lighting and Sound Design Lab. 1 Credit.
Further study and practice of Lighting and Sound Design by participating in the preparation of lighting and sound for the Theatre NDSU production season. Co-req: THEA 276.

THEA 228. Development of Musical Theatre. 3 Credits.
Introduction to Musical Theatre. Lectures provide historical survey. Weekly labs are devoted to active exploration of representative musical theatre repertoire. Cross-listed with MUSC 228.

THEA 230. Introduction to Theatrical Rendering. 3 Credits.
This course will teach students the basics of drawing and rendering for theatrical design practices utilizing various mixed media.

THEA 250. Theatre Foundations II. 1 Credit.
Seminar course for second year Theatre majors. Covers various topics related to auditions/interviews and pursuing careers in theatre. Meets once a week.

THEA 260. Theatre for Young Audiences Ensemble. 3 Credits.
The Theatre for Young Audiences Ensemble will use improvisation, storytelling, and creative drama techniques to create an original play for young audiences. Class will culminate with the ensemble presenting their play in local schools. Prereq: THEA 160.

THEA 262. Introduction to Dance. 1 Credit.
Practicum course expanding the beginning student performer's physical/kinesthetic awareness. Examines basic styles of dance as employed in theatrical presentation (ballet, modern dance, jazz, and/or tap). Basics in theatre dance audition techniques, and choreography.

THEA 263. Dance Studio. 1 Credit.
Introduction to the basic concepts and principles of Lyrical ballet, jazz or tap dance through studio experiences. Each semester will focus on one specific style. May be repeated for credit with change in topic.

THEA 266. Voice and Movement for the Actor. 3 Credits.
An introduction to the theory and practice of ideal vocal production and physical self-use. Exercises are offered addressing breath control, alignment, relaxation, resonance, articulation, projection, and expansion of physical and vocal creative expression. Prereq: THEA 161.

THEA 267. Acting for the Camera. 3 Credits.
An introductory examination and exploration of the technique of acting for the camera. This class is a practical studio course where students take their acting skills and adapt them for the use of camera acting. Prereq: THEA 161.

THEA 268. Acting the Song I. 3 Credits.
Study and application of the integration of acting and singing techniques. Restricted to Theatre and Music majors only. Prereq: MUSC 167 (1 semester). Co-req: THEA 161.

THEA 270. Stagecraft. 3 Credits.
An introduction to the crafts and technologies used in the production of scenery, lighting and sound in the theatre. Three 1-hour lectures, one 2-hour laboratory.

THEA 271. Costume Craft. 3 Credits.
Introduction to the techniques used for constructing costumes for theatre. 3 lectures, 1 two-hour laboratory.

THEA 272. Drawing for the Theatre. 3 Credits.
Introduction to drawing for the theatre to include hand and computer-assisted drafting techniques.

THEA 274. Introduction To Stage Design. 3 Credits.
Translation of text and music into ideas for stage design (scenery, costumes, lights) and introduction to use of both traditional and modern technologies in the process.

THEA 275. Theatrical Makeup Design. 3 Credits.
Fundamentals of stage makeup.; facial analysis and introduction to materials and techniques. Character interpretation through two and three-dimensional application.

THEA 279. Scenic Painting. 3 Credits.
This course covers basic scenic painting techniques and common practices.

THEA 280. World Theatre. 3 Credits.
Survey of the theatre and drama of various European and non-Western cultures.

THEA 291. Seminar. 1-5 Credits.

THEA 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

THEA 294. Individual Study. 1-5 Credits.

THEA 296. Field Experience. 1-15 Credits.

THEA 299. Special Topics. 1-5 Credits.

THEA 301. Musical Theatre Troupe. 1 Credit.
A select performance ensemble of 10-20 students. Students will develop, do research on, and present songs and choreography from musical theatre productions. By audition and permission of instructor. May be repeated.

THEA 345. Devising. 3 Credits.
Development and application of skills required to create and perform innovative devised performances.

THEA 350. Theatre Foundations III. 1 Credit.
Seminar course for third year Theatre majors. Covers topics related to building the skills necessary to find work as a theatre professional. Meets once a week.

THEA 361. Acting III: Advanced Realism. 3 Credits.
Advanced studies in realistic acting technique and scene work. Course open to student with BFA-standing only. Prereq: THEA 261.

THEA 362. Dance Styles for Theatre. 2 Credits.
Intermediate study of the concepts and principles of ballet, tap and lyrical/jazz through studio practice and performance. May be repeated for credit. Restrictions: BFA MT permission of the Instructor or Head of the Dept.

THEA 363. Dance Studio II. 2 Credits.
Intermediate study in the study of the concepts and principles of ballet, modern, jazz, or tap dance through studio practice and performance. May be repeated for credit. Prereq: THEA 263.

THEA 364. Advanced Acting. 3 Credits.
Practical application of fundamental skills to textual work. Prereq: THEA 161.

THEA 365. Directing I. 3 Credits.
Introduction to the creative process of directing. Focus on script analysis, basic directing tools, and scene work. Prereq: THEA 161.

THEA 367. Acting the Song. 3 Credits.
Study and application of the integration of acting and singing techniques. This class will focus on developing the skills necessary for integrating acting methodologies with musical theatre songs and voice work. Students will explore emotional truth and embodied choices in combination with vocal dynamics to communicate effective storytelling. Prereq: MUSC 167 (1 semester), THEA 161 and students must be Theatre or Music majors only.

THEA 368. Business of Acting. 3 Credits.
Advanced study in business of acting, addressing resume/portfolio, photos, audition package/interviews, agents, unions, graduate programs, national theatre organizations, and audition resources. Prereq: BFA standing, THEA 261, THEA 266.

THEA 370. Technical Theatre Production. 1-3 Credits.
Advanced study in technical theatre production. Emphasis on planning and realization of technical theatre elements. Hours arranged as appropriate to assignment. Student should consult with instructor on number of credits to take. May be repeated for credit.

THEA 371. Introduction to Design: Scenic Design. 3 Credits.
This course introduces students to scenic design for the stage through play analysis, research, preliminary sketches, drafting, paint elevations and model building.

THEA 373. Lighting and Sound Design for the Theatre. 3 Credits.
An introduction to the art of theatrical lighting and sound design.

THEA 375. Costume Design for the Theatre. 3 Credits.
Introduction to the principles and practices of costume design for the theatre through script analysis, research, fabric selection, and sketching.

THEA 376. Theatrical Design Studio I: Theatrical Drawing and Rendering. 3 Credits.
Drawing and rendering techniques for theatrical designers.

THEA 377. Theatrical Design Studio II: Collaboration of the Designer. 3 Credits.
Development of collaboration, enhancement of design theory, and advanced practice of the design process.

THEA 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

THEA 381. Technical Theatre Seminar. 1 Credit.
A detailed study into the different technologies and processes involved in the technical areas of theatrical production. Each class will involve concentrated study in one category of technical production skills. May be repeated for credit.

THEA 385. Period Style for Performance. 3 Credits.
The study of western and non-western historical style (architecture, furniture, and clothing) in contemporary performance. Classical Greece to 19th Century.

THEA 386. Theatrical Design Studio III; Design for Alternative Venues. 3 Credits.
Advanced study, studio practice and critique. Development of concept and content for alternative venues. Prereq: THEA 286, THEA 287.

THEA 387. Theatrical Design Studio IV; Research in the Studio. 3 Credits.
Advanced study, studio practice and critique. Emphasis on research techniques, professional practice, and presentation. Prereq: THEA 286, THEA 287.

THEA 391. Seminar. 1-5 Credits.

THEA 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

THEA 394. Individual Study. 1-5 Credits.

THEA 396. Field Experience. 1-15 Credits.

THEA 397. Co-op Internship. 1-5 Credits.

THEA 399. Special Topics. 1-5 Credits.

THEA 450. Capstone Experience. 3 Credits.
Demonstration of mastery in selected area of theatre through an advanced project in acting, directing, design/technical theatre, or dramaturgy. Departmental capstone experience. Prereq: Senior standing.

THEA 461. Acting Shakespeare. 3 Credits.
Advanced training in techniques for analysis, preparation and performance of Shakespeare's plays and sonnets. Prereq: BFA standing with emphasis in Performance,THEA 261, THEA 266.

THEA 462. Acting Styles. 3 Credits.
Introduction to various major performance styles, ranging from Greek tragedy through twentieth century nonrealism Styles covered include Greek, French neoclassical, Brechtian epic theatre, and absurdism. Prereq: THEA 261.

THEA 463. Acting the Song II. 3 Credits.
Advanced study and application of the integration of acting and singing techniques. This class will focus on a deeper development of the skills necessary for integrating acting methodologies with musical theatre song and voice work. Students will continue to explore emotional truth and embodied choices in combination with vocal dynamics to communicate effectively to an audience. Prereq: THEA 367 and restricted to Theatre and Music majors only.

THEA 465. Directing II. 3 Credits.
Problems in directing, formulating production concepts, casting, working with actors, and aiding characterization. Includes preliminary work with thrust and arena staging. Prereq: THEA 365. {Also offered for graduate credit - see THEA 665.}.

THEA 466. Advanced Voice for the Actor. 3 Credits.
Intensive examination/development of the vocal mechanism. Focus on consonant/vowel production, diction/articulation, resonance/placement, and breath/posture complemented by introduction of IPA, character voices, and dialects. Prereq: BFA standing in Performance Track, THEA 266.

THEA 467. Advanced Movement for the Actor. 3 Credits.
Advanced level movement course introducing codified styles of theatre movement including neutral and character mask, pedestrian mime, unarmed and armed stage combat Prereq: BFA standing, THEA 266.

THEA 469. Musical Theatre Audition. 3 Credits.
Designed to give students confidence and integrity for auditions in the realm of musical theatre, with a focus on choosing appropriate material and preparation for the audition and performance. Through a process driven approach of active investigation through repertoire the actor will gain skills to prepare and present a dynamic Musical Theatre audition. The actor will understand the appropriate audition etiquette expected of them to have successful career in the industry. Prereq: THEA 228, THEA 367, and THEA 463.

THEA 480. History and Literature of Theatre I. 3 Credits.
Historical study of theatre architecture, staging methods, individual artists and plays from classical Greece to contemporary times. Prereq: THEA 180.

THEA 481. History and Literature of the Theatre II. 3 Credits.
Historical study of theatre architecture, staging methods, individual artists and plays from the 18th century to the present. Prereq: THEA 480.

THEA 485. Directing III. 3 Credits.
Active practice and investigation in building rehearsal, conducting analysis, and collaborating with actors. Prereq: THEA 465.

THEA 486. History of Dress and Decor I; the Foundations of Western Style. 3 Credits.
Survey of historical architecture, interiors, and clothing beginning with antiquity through the 18th century.

THEA 487. History of Dress and Decor II; Western Style since 1800. 3 Credits.
Survey of historical architecture, interiors, and clothing after 1800 through the 1970s.

THEA 491. Seminar. 1-5 Credits.

THEA 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

THEA 494. Individual Study. 1-5 Credits.

THEA 494H. Individual Study. 1-3 Credits.

THEA 496. Field Experience. 1-15 Credits.

THEA 499. Special Topics. 1-5 Credits.

Transportation & Logistics (TL)

TL 116. Business Software Applications. 3 Credits.
Instruction on the use of popular spreadsheet and database software applications including how and when to apply the features of these types of applications to address a variety of business problems. Content emphasizes leveraging widely used business tools via hands-on activities. Credit will be awarded only for TL 116, MIS 116, CSCI 114, or CSCI 116 but not more than one.

TL 711. Integrated Supply Chain System. 3 Credits.
Foundation material critical to establishing effective supply chains and analyzing existing supply chains under different decision-making environments. Topics include supply chain strategy, procurement, inventory theory, aggregate planning, six sigma quality, lean production, forecasting, logistics, and project management.

TL 715. Introduction to ERP. 3 Credits.
This course introduces students to Enterprise Systems and their implementation. Topics covered include: process integration, value chain management, change management, project management, and knowledge management.

TL 719. Crisis Analysis and Homeland Security. 3 Credits.
Provides an integrated approach to crisis analysis and response within the contexts of military logistics and homeland security. Focus is on the social and cultural context of emergencies, disasters and catastrophes.

TL 721. Global Supply Chain Management. 3 Credits.
This course provides a coherent perspective on contemporary global logistics from raw materials through production to the customer. Addresses the roles of governments and intermediaries, international sourcing and the application of local trade laws. Discussion of economic, political, and social issues that may affect international transportation.

TL 725. ERP Configuration. 3 Credits.
Examines the impact of sensor network systems driving business data collection, and the configuration of Enterprise Systems. Includes peer reviewed articles pertaining to enterprise network system application theory with a focus on supply chain systems. Prereq: TL 715.

TL 731. Supply Chain Decision Analysis. 3 Credits.
This course covers collection, management and analysis of logistics information necessary to make good decisions as well as quantitative decision analysis models for systematic evaluation of decision situations involving uncertainty, complexity, alternatives, and preferences.

TL 733. Case Studies in Supply Chain. 3 Credits.
This course will focus on actual supply chain cases along with solutions and how individual/organizational decisions relate to the ultimate outcome. Analyzing processes which would have reduced/eliminated the supply chain's susceptibility to success or failure.

TL 735. Practical Data Analytics. 3 Credits.
This course provides a comprehensive overview of data analytics and business intelligence concepts with practical experience using market-leading enterprise software solutions. Topics include data management, the extract-transform-load process, data cleansing, data reporting and visualization, building dashboards, development and use of online analytical processing (OLAP) cubes, data warehouses, and data mining.

TL 751. Supply Chain Transport Security. 3 Credits.
Fundamentals of multimodal transportation physical security and cybersecurity, crisis management, and best practices to enable a safe and reliable supply chain.

TL 752. Transportation Planning and Environmental Compliance. 3 Credits.
This course provides an overview of the procedures of transportation planning and environmental compliance, to include an understanding of the related policies and procedures as they relate to transportation systems, and compliance with local, state, and federal laws. A discussion of emissions, hazardous cargo, and permitting also will be provided.

TL 754. Urban Transportation Systems Analysis. 3 Credits.
This course provides students with an understanding of system analysis tools used in urban transportation. Students will work with analytical techniques employed in urban transportation planning, such as traffic forecasting and system capacity analysis and apply these techniques using real-world data for analyzing both the demand and supply of transportation.

TL 755. City Logistics. 3 Credits.
This course studies urban freight distribution, issues and challenges of city logistics, and strategies that can improve the overall efficiency of the movement of goods in cities, while meeting customer demands and mitigating externalities such as congestion and emissions.

TL 756. Transportation and Land Use Integration. 3 Credits.
This course provides students with an understanding of the interrelationships that exist between land use and transportation and the related impacts to the economy, environment and to society as a whole in the planning context.

TL 757. Technologies for Supply Chain Transport Solutions. 3 Credits.
Fundamentals of technologies deployed and emerging such as vehicle automation, electrification, sharing, and connectivity. Technologies address critical issues that affect supply chain movements and reliability, such as congestion, safety, security, and energy efficiency.

TL 785. Spatial Analysis in Transportation. 3 Credits.
This course focuses on applications of Geographic Information Systems (GIS) to transportation networks and problems. The emphasis is on data modeling. Topics include: linear referencing, dynamic segmentation, network analysis, urban and land use planning, routing of hazardous materials, and asset management applications.

TL 786. Public Transportation. 3 Credits.
This course focuses on public transportation issues, concepts, and modeling procedures. Topics covered include policy issues, impacts of transit, government's role in transit, service planning, operations, demand analysis, performance evaluation, quality of service concepts and estimation, and bus and rail capacity.

TL 787. Transportation and Distribution. 3 Credits.
The course helps students understand freight transportation from both private and public sectors' perspectives through topics of integrated logistics, transportation systems, channels of distribution, distribution management, globalization, intermodal transportation, freight transportation management, and various transportation modes including maritime, air, rail, and road and their interrelationships.

TL 789. Managerial Leadership for Supply Chain Professionals. 3 Credits.
This course focuses on exploring theories, concepts, and practices of managerial leadership and their application to supply chain issues. The most current leadership theories and practices will be examined and applied to supply chain professionals.

TL 790. Graduate Seminar. 1-5 Credits.

TL 791. Temporary/Trial Topics. 1-5 Credits.

TL 792. Graduate Teaching Experience. 1-6 Credits.

TL 793. Individual Study. 1-5 Credits.

TL 794. Practicum/Internship. 1-8 Credits.

TL 795. Field Experience. 1-10 Credits.

TL 796. Special Topics. 1-5 Credits.

TL 797. Master's Paper. 1-3 Credits.

TL 798. Master's Thesis. 1-10 Credits.

TL 811. Modeling for Logistics Research. 4 Credits.
Models used in logistics research are studied. Topics include statistical models, mathematical programming, network models, stochastic decision processes, and simulation. The ability to perform and present logistics research is cultivated.

TL 823. Seminar in Supply Chain Research. 3 Credits.
This course focuses on challenges and research opportunities in supply chain management. Topics include supplier and customer relationships, distribution, warehousing, information technology enablers, transportation issues in supply chain, supply chain sustainability, supply chain resilience, different types of inventory challenges, and human factors in supply chain. The ability to perform and present supply chain research is cultivated.

TL 831. Supply Chain Modeling Algorithms and Decision Analysis. 3 Credits.
This course focuses on the application of supply chain techniques to model and solve new and emerging supply chain management problems. It emphasizes critical thinking skills and excel spreadsheet modeling skills to solve deterministic analytic models, stochastic analytic models, and simulation model applications in supply chains. It includes an introduction to modeling, excel, add-in tools. Prereq: TL 888.

TL 881. Human Wellbeing through Transportation. 3 Credits.
This course focuses on how passenger transportation services and transportation infrastructure contributes to human wellbeing. Topics include public transportation's and on-demand technology enabled transportation services contribution to livability, and contribution of transportation facilities and infrastructure towards human wellbeing.

TL 882. Transportation Systems. 3 Credits.
This course provides an overview and fundamental introduction of transportation systems in the view of global supply chain management. Highlighted topics include the role and importance of transportation in global supply chains, the economy, transportation technology, costing and pricing, all modes of freight transportation, and transportation issues and challenges for global supply chains.

TL 883. Introduction to Rail Transportation. 3 Credits.
This course provides an overview of rail transportation and industry including: rail transportation system components, regulations, organizations, the economy, environmental considerations, operations, route analysis, line capacities, technology, and multimodal freight issues. The emphasis is on railway and freight transportation including: planning, operations, capacity, sustainability and environmental considerations. Prereq: TL 882.

TL 885. Spatial Analysis in Transportation & Supply Chain. 3 Credits.
Fundamentals of geospatial analysis and optimization with applications in transportation, logistics, and supply chain management. Highlighted topics include mobility optimization, logistical distribution balancing, facility coverage optimization, spatial autocorrelation, and spatial regression.

TL 888. Research Methods. 3 Credits.
This course focuses on the conduct of scientific research in transportation and supply chain management. Students will study quantitative, qualitative, and mixed methods concepts, strategies, and practices. The course will also cover formulating research problems, choosing and applying proper research method design, writing proposals and reports, and presenting results. Critical research issues are highlighted.

TL 892. Graduate Teaching Experience. 1-6 Credits.

TL 893. Individual Study/Tutorial. 1-5 Credits.

TL 899. Doctoral Dissertation. 1-15 Credits.

Tribal and Indigenous Peoples Studies (TIPS)

TIPS 101. Introduction to Native American & Indigenous Studies. 3 Credits.
An overview of the study of Indigenous peoples, including Native societies prior to the arrival of Europeans; contact and colonialism; Indigenous knowledge systems, nationalism, and sovereignty; and contemporary Native issues.

TIPS 494. Individual Study. 1-5 Credits.

University, General (UNIV)

UNIV 101. Major Exploration and Academic Planning. 1 Credit.
This course will guide students through the process of exploring academic majors and related careers using a variety of methods. Additionally, students will learn to navigate NDSU resources and technologies as well as integrate success strategies into their college careers. Prereq: Restricted to first-year students only.

UNIV 150. Foundations of Science. 3 Credits.
This course covers basic findings from several scientific fields, including chemistry, physics, geology, biology, and psychology, with an emphasis on the methods of discovery in these disciplines.

UNIV 151. Science and Society. 3 Credits.
Explores interplay between scientific, economic, and political aspects of technically based, possibly politically contentious, societal challenges. Aims to instill appreciation for breadth, complexity of emerging societal challenges; need for collaboration among disciplines to realize solutions.

UNIV 189. Skills For Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

UNIV 194. Individual Study. 1-5 Credits.

UNIV 196. Field Experience. 1-15 Credits.

UNIV 199. Special Topics. 1-5 Credits.

UNIV 220. Career and Graduate School Preparation. 1 Credit.
This course, Career and Grad School Prep, will provide developmental strategies for SSS students who are interested in building career readiness skills and who wish to pursue an education beyond a bachelor's degree. This course provides excellent support and guidance for developing a career plan, interviewing techniques, as well as advising on completing graduate school applications and/or job applications. Prereq: Participants in this course must be an enrolled in TRIO SSS at NDSU.

UNIV 291. Seminar. 1-5 Credits.

UNIV 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

UNIV 294. Individual Study. 1-5 Credits.

UNIV 297. FE/Coop Ed/Internship. 1-15 Credits.

UNIV 299. Special Topics. 1-5 Credits.

UNIV 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

UNIV 391. Seminar. 1-5 Credits.

UNIV 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

UNIV 394. Individual Study. 1-5 Credits.

UNIV 396. Field Experience. 1-15 Credits.

UNIV 397. Fe/Coop Ed/Internship. 1-15 Credits.

UNIV 399. Special Topics. 1-5 Credits.

UNIV 411. Global Learning. 1 Credit.
Development of independent thought and action, identity and values, and intercultural awareness and skills as a global citizen in conjunction with a Global Practicum, international internship, or other abroad program. May be repeated. Standard grading. Prereq: Prior approval by International Student and Study Abroad Services.

UNIV 440. Writing for Scholars, Fellows and Researchers. 1 Credit.
Students will develop an understanding of the academic genre of grant and fellowship applications by analyzing a specific granting program, practicing the elements required for the application, and submitting a completed application. Pass/Fail only. Restrictions: Students must be planning to apply for the grant or fellowship identified in the course section in which they enroll. {Also offered for graduate credit - see UNIV 640}.

UNIV 489. Capstone Experience. 3 Credits.
Integrate coursework in student's area(s) of emphasis as stated in their proposal; explore options and apply strategies related to post-graduation career goals. F,S.

UNIV 491. Seminar. 1-5 Credits.

UNIV 491H. Seminar. 1-3 Credits.

UNIV 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

UNIV 494. Individual Study. 1-5 Credits.

UNIV 496. Field Experience. 1-15 Credits.

UNIV 499. Special Topics. 1-5 Credits.

UNIV 499H. Special Topics. 1-5 Credits.

UNIV 640. Writing for Scholars, Fellows and Researchers. 1 Credit.
Students will develop an understanding of the academic genre of grant and fellowship applications by analyzing a specific granting program, practicing the elements required for the application, and submitting a completed application. Satisfactory/Unsatisfactory only. Restrictions: Students must be planning to apply for the grant or fellowship identified in the course section in which they enroll. {Also offered for undergraduate credit - see UNIV 440}.

UNIV 692. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

UNIV 695. Field Experience. 1-15 Credits.

UNIV 790. Graduate Seminar. 1-5 Credits.

UNIV 791. Temporary/Trial Topics. 1-5 Credits.

UNIV 793. Individual Study/Tutorial. 1-5 Credits.

UNIV 795. Field Experience. 1-15 Credits.

Veterinary Science (VETS)

VETS 101. Student Success Techniques: Veterinary Technology. 1 Credit.
This course is designed to ease the transition for new students. Students will learn skills and techniques used by successful college students. Topics will include: an overview of the Veterinary Technology Program and profession, professional communication, career opportunities, as well as student success basics.

VETS 115. Medical Terminology for the Paraprofessional. 1 Credit.
Medical terminology explored through a systematic study of word parts and the combinations used to build medical terms.

VETS 125. Animal Restraint. 2 Credits.
Study of behavioral characteristics and handling techniques of farm, companion, and laboratory animals.

VETS 194. Individual Study. 1-5 Credits.

VETS 196. Field Experience. 1-15 Credits.

VETS 199. Special Topics. 1-5 Credits.

VETS 249. Veterinary Hospital Information and Procedures. 2 Credits.
Principles of veterinary hospital management and client relations/education. Prereq: Accepted into the Veterinary Technology major.

VETS 255. Veterinary Diagnostic Imaging. 2 Credits.
The study of diagnostic radiograph production, including: x-ray machine operation, dark room procedures, radiographic positioning, and radiation safety. Ultrasound and other forms of alternative imaging will also be discussed. Prereq: ANSC 218, ANSC 219, and admission into the Veterinary Technology program. Co-req: VETS 255L.

VETS 255L. Veterinary Diagnostic Imaging Laboratory. 1 Credit.
A laboratory course designed to supplement material covered in the associated VETS 255 lecture. Radiographic positioning, production, and processing will be covered, along with alternative imaging modalities. Prereq: Acceptance into the Veterinary Technology major. Co-req: VETS 255.

VETS 265. Veterinary Nursing I. 2 Credits.
Clinical procedures and instrumentation used in the day-to-day operation of a companion animal veterinary practice. Prereq: Must be accepted into the Veterinary Technical program. Co-req: VETS 265L.

VETS 265L. Veterinary Nursing Lab I. 1 Credit.
Hands on practice of clinical procedures and instrumentation use common in the day-to-day operation of a veterinary practice. Co-req: VETS 265 and acceptance into the Veterinary Technology program.

VETS 267. Veterinary Nursing II. 2 Credits.
Introduction and knowledge expansion of the clinical procedures, instrumentation, animal behaviors, sample collection, and disinfection techniques used in the day-to-day operation of a veterinary facility. Co-req: VETS 267L. Prereq: VETS 265, VETS 265L.

VETS 267L. Veterinary Nursing Lab II. 1 Credit.
Introduction and knowledge expansion of the hands on clinical procedures, instrumentation, animal behaviors, sample collection, necropsy techniques, and disinfection techniques used in the day-to-day operation of a veterinary facility. Prereq: VETS 265, VETS 265L. Co-req: VETS 267.

VETS 291. Seminar. 1-5 Credits.

VETS 292. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

VETS 294. Individual Study. 1-5 Credits.

VETS 296. Field Experience/Practicum. 1-15 Credits.

VETS 299. Special Topics. 1-5 Credits.

VETS 367. Principles of Companion Animal Dentistry. 1 Credit.
Basic principles of veterinary dentistry. Including dental anatomy, physiology, pathophysiology, charting, and instrumentation. Techniques of routine dental prophylaxis, periodontal disease therapies, client education, and preventative oral care will be emphasized. Co-req: VETS 367L and must be a Veterinary Technology major. Prereq: VETS 267 and VETS 267L.

VETS 367L. Principles of Companion Animal Dentistry Lab. 1 Credit.
Basic principles of veterinary dentistry lab. Including dental anatomy, physiology, pathophysiology, charting, and instrumentation. Techniques of routine dental prophylaxis, periodontal disease therapies, client education, and preventative oral care will be emphasized. Co-req: VETS 367.

VETS 369. Companion Small Mammal and Exotic Animal Health and Husbandry. 2 Credits.
Students will be introduced to the biology, reproduction, and husbandry requirements of domestic small mammal and exotic species. The role these species play in the human animal bond will also be addressed. Prereq: ANSC 218. Restrictions: Students must be of sophomore status and majoring or minoring in Veterinary Technology, Animal Science, or Equine Science.

VETS 369L. Companion Small Mammal and Exotic Animal Health and Husbandry Laboratory. 1 Credit.
A laboratory course for Veterinary Technology students which is designed to supplement material covered in the associated lecture, VETS 369. Handling, restraint, nursing, and management techniques relating to small mammal and exotic species will be covered. Prereq: VETS 135, VETS 136, VETS 256. Co-req: VETS 369. Restrictions: Student be be a Veterinary Technology major.

VETS 379. Global Seminar. 1-6 Credits.
NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

VETS 385. Veterinary Parasitology. 2 Credits.
Study of parasitology principles commonly dealt with in veterinary medicine. Co-req: VETS 385L and acceptance in the Veterinary Technology major.

VETS 385L. Veterinary Parasitology Lab. 1 Credit.
Study of parasitology procedures commonly utilized in veterinary medicine. Co-req: VETS 385 and admission to the Veterinary Technology major.

VETS 386. Veterinary Hematology. 2 Credits.
Study of hematology in mammals with a veterinary medicine emphasis. Co-req: VETS 386L and acceptance into the Veterinary Technology major.

VETS 386L. Veterinary Hematology Lab. 1 Credit.
Study of hematology procedures commonly utilized in veterinary medicine. Co-req: VETS 386 and admission to the Veterinary Technology major.

VETS 387. Veterinary Clinical Pathology. 2 Credits.
A course regarding the study of urine analysis, cytology and serum chemistry principles and procedures commonly utilized in veterinary medicine. Co-req: VETS 387L and acceptance into the Veterinary Technology major.

VETS 387L. Veterinary Clinical Pathology Laboratory. 1 Credit.
Hands-on course regarding the study of urine analysis, cytology and serum chemistry principles and procedures commonly utilized in veterinary medicine. Co-req: VETS 387 and acceptance into the Veterinary Technology major.

VETS 391. Seminar. 1-5 Credits.

VETS 392. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

VETS 394. Individual Study. 1-5 Credits.

VETS 399. Special Topics. 1-5 Credits.

VETS 455. Veterinary Applied Pharmacy Practices. 1 Credit.
Practice of veterinary pharmacology including dose calculations, pharmacy terms, prescribing practices, drug dispensing, and regulations governing drug approval, prescribing and dispensing in veterinary practice. Prereq: MATH 103 or MATH 104 or MATH 105 or an equivalent course and admission into the Veterinary Technology program.

VETS 456. Veterinary Pharmacology and Pharmacy Practice. 2 Credits.
Use of drugs in veterinary medicine including commonly used drugs and drug classes and their indications, contraindications and therapeutic effects. Regulations affecting the prescribing and dispensing of drugs in veterinary medicine. Prereq: restricted to Pharmacy majors only.

VETS 457. Veterinary Pharmacology. 2 Credits.
Students will learn about veterinary drugs, how they work, and how they are used, so that students can safely, knowledgably, and confidently administer and dispense drugs in veterinary practice. Prereq: Acceptance into the Veterinary Technology program.

VETS 460. Veterinary Anesthesiology. 2 Credits.
Preparation for and assistance with veterinary surgical procedures. Provision of proper aftercare for veterinary surgical patients. Prereq: Acceptance into the Veterinary Technology program, VETS 267, VETS 267L, and VETS 455. Coreq: VETS 460L.

VETS 460L. Veterinary Anesthesiology Lab. 1 Credit.
Preparation for and assistance with veterinary surgical procedures. Provision of proper aftercare for veterinary surgical patients. Prereq: VETS 357, VETS 385, VETS 386 and students must be admitted to the Veterinary Technology major. Co-req: VETS 460.

VETS 461. Veterinary Surgical Nursing Techniques. 2 Credits.
Preparation for and assistance with veterinary surgical procedures. Provision of proper aftercare for veterinary surgical patients. Prereq: Acceptance into the Veterinary Technology program. Co-req: VETS 461L.

VETS 461L. Veterinary Surgical Techniques Laboratory. 1 Credit.
Preparation for assistance with veterinary surgical procedures. Provisions of proper aftercare for veterinary surgical patients. Prereq: Acceptance into the Veterinary Technology program. Co-req: VETS 461.

VETS 481. Ward Care/Clinic Care. 1 Credit.
Supervised experience managing the care and feeding of Veterinary Technology Program animals and clinical veterinary facilities. May be repeated 4 times. Restrictions: Must be a student in the Veterinary Technology major.

VETS 482. Large Animal Techniques. 2 Credits.
Handling, restraint, nursing, and management techniques used in large animal veterinary practice. Primarily focused on cattle and horses. Prereq: VETS 256.

VETS 482L. Large Animal Techniques Laboratory. 1 Credit.
A laboratory course designed to supplement material covered in VETS 482. Handling, restraint, nursing, and management techniques used in large animal veterinary practice. Primarily focused on cattle and horses. Prereq: VETS 256. Co-req: VETS 482.

VETS 483. Clinical Veterinary Practicum. 1 Credit.
A case based course designed to pull together the knowledge learned in lectures and the skills taught in labs throughout the Veterinary Technology program. Restrictions: Must be accepted into the Veterinary Technology program.

VETS 485. Veterinary Technology Externship. 3 Credits.
This course is the capstone experience for veterinary technology students. This course involves continued development of skills and application of knowledge through supervised work in a veterinary practice or other appropriate clinical setting. Refer to the Department of Animal Sciences for further information regarding the Veterinary Technology program. Prereq: VETS 367, VETS 367L, VETS 369, VETS 460, VETS 460L, VETS 461, VETS 461L.

VETS 491. Seminar. 1-5 Credits.

VETS 492. Global Practicum: Study Abroad. 1-15 Credits.
Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P'or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

VETS 494. Individual Study. 1-5 Credits.

VETS 496. Field Experience. 1-15 Credits.

VETS 499. Special Topics. 1-5 Credits.

Women and Gender Studies (WGS)

WGS 110. Introduction to Women's Studies. 3 Credits.
Exploration of a range of social/domestic and global issues related to women; development of a feminist framework for thinking and writing about woman and gender.

WGS 112. Introduction to Masculinities. 3 Credits.
Exploration of the lives of men and boys and the diverse experiences and public discourses about masculinity; the role of men and boys in sports, family, work and other social relationships.

WGS 194. Individual Study. 1-5 Credits.

WGS 199. Special Topics. 1-5 Credits.

WGS 294. Individual Study. 1-5 Credits.

WGS 340. Perspectives in LGBTQ Studies. 3 Credits.
Exploration of sexual orientation, gender identity, and bodies from multiple contemporary feminist and queer perspectives. Course provides an opportunity to increase knowledge of the scholarship and writings in LGBTQ studies. Recommended prereq: WGS 110 or WGS 112.

WGS 350. Perspectives in Women's Studies. 3 Credits.
Exploration of women and gender from many perspectives. Course provides an opportunity to increase knowledge of the scholarship and writings in Women's Studies, including authors such as Friedan, Baumgardner and Richards, Wolf, and Roiphe. Prereq: WGS 110.

WGS 370. Transnational/Global Women. 3 Credits.
Understanding women's lives within the contemporary context of transnationalism, where the local and the global are integrally linked and perspectives are informed by gender, race, class, sexuality, and nationality.

WGS 394. Individual Study. 1-5 Credits.

WGS 399. Special Topics. 1-5 Credits.

WGS 426. Women in American History. 3 Credits.
A survey of political, social, economic, and cultural development of American women from colonial times to the present with a focus on the lived experiences of diverse groups of women. Central themes are: the incongruity of ideal and reality, the fluidity of gender expectations and the "public" sphere, women's ability to navigate different power structures successfully, work and sexual division of labor, and the role of family and personal life. Cross-listed with HIST 426. Dual-listing: WGS 626.

WGS 489. Internship/Capstone. 3 Credits.
Integrate coursework taken in Women's Studies major; apply knowledge to women's events and experiences; explore career and graduate options in the field of Women's Studies.

WGS 491. Seminar. 1-5 Credits.

WGS 494. Individual Study. 1-5 Credits.

WGS 496. Field Experience. 1-15 Credits.

WGS 499. Special Topics. 1-5 Credits.

WGS 626. Women in American History. 3 Credits.
A survey of political, social, economic, and cultural development of American women from colonial times to the present with a focus on the lived experiences of diverse groups of women. Central themes are: the incongruity of ideal and reality, the fluidity of gender expectations and the "public" sphere, women's ability to navigate different power structures successfully, work and sexual division of labor, and the role of family and personal life. Cross-listed with HIST 626. Dual-listing: WGS 426.

WGS 790. Graduate Seminar. 1-5 Credits.

WGS 795. Field Experience. 1-15 Credits.

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