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Home

About the Catalog

The University Catalog serves as the official source for program curricula, course descriptions, academic policies, and procedures governing course registration and degree completion. It is available online, with options to download individuals pages or the complete catalog as a PDF.

This catalog supplements the NDSU website and materials from the Office of Admission, the Graduate School, and the academic units. It contains academic policies, official program curricula, and course descriptions relevant to all students. Undergraduate and professional students refer to the admission and undergraduate sections, while graduate students should consult the graduate section for all information including admission. The catalog also links directly to the official websites of the colleges, departments, and student resources for the most current details. The academic policies and information are effective for the published academic year. An archive of past catalogs is available.

Undergraduate curricula are effective for students declaring their program in the publication year and are subject to the baccalaureate degree and graduation requirements. Undergraduate academic and curriculum questions may be referred to the Office of Registration and Records (<https://www.ndsu.edu/registrar/>). Graduate students should refer to the Graduate section. Graduate program and policy questions can be directed to the Graduate School (<https://www.ndsu.edu/gradschool/>).

Students should familiarize themselves with relevant information, including registration, academic progress, and degree requirements, and are encouraged to consult their advisors. All students should be aware of the NDSU Policy 335: Academic Responsibility and Conduct (<https://www.ndsu.edu/fileadmin/policy/335.pdf>) and the 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 (FERPA) (<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)

While every effort is made to ensure accuracy, the university reserves the right to modify its rules and regulations at any time, including those concerning admission, instruction, and graduation. This right extends to withdrawing curricula and specific courses, changing or discontinuing programs, altering course content, revising the academic calendar, and imposing or increasing tuition and fees. Program requirements and course prerequisites may be effective even if not explicitly stated in this catalog. All changes become effective when determined by university authorities and may apply to both prospective and currently enrolled students.

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/)

Institutional Accreditation

NDSU holds institutional accreditation from the Higher Learning Commission (<https://www.hlcommission.org/>) (230 South LaSalle St., Suite 7-500, IL 60604-1411). Many academic programs also have accreditation or approval from their professional organizations.

Additional Accrediting Agencies

A list of accrediting agencies (https://www.ndsu.edu/oira/resourcesresearch_links/accrediting_agencies/) is available on the Office of Institutional Research and Analysis website.

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/>)
- North Dakota State Seed Department (<https://www.seed.nd.gov/>)
- Metro College Alliance (<https://metrocollegealliance.com/>)
- 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 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.

Admission

NDSU is dedicated to your success. We prepare you to solve challenges that will shape a better world. 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 (<https://www.ndsu.edu/international/apply/undergraduate/>) 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 (p. 73) catalog page or the Graduate School website (<https://www.ndsu.edu/gradschool/>).

Readmission

For more information on returning to NDSU as a former student, select the Undergraduate Readmission tab.

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.

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 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 who will require an F-1 or J-1 visa must demonstrate English proficiency by providing official results from an approved proficiency exam such as the TOEFL, IELTS, Duolingo English Test, ACT, or SAT. Students may review English Proficiency (https://www.ndsu.edu/admission/how_to_apply/international/english_proficiency/) requirements and waiver countries on the Admission website. Contact the Office of International Student & Study Abroad Services (<https://www.ndsu.edu/international/>) if you feel you qualify for an 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.

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.

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 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 discontinue 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 discontinue 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. It is highly recommended a student submit the *Reactivation* form early and arrange to have transcripts sent 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 discontinue 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 = December 1 (until midnight)
- Readmission consideration in a Fall semester = August 1 (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.

Colleges

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

Dean Greg Lardy

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

Dean Kimberly Wallin

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

Dean Kathryn Birkeland

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

Dean Yueh-Ting "Y-T" Lee

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

Dean Alan Kallmeyer

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

Dean Teresa Conner

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

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

Design, Architecture, and Art, School of (<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

Education, School of (<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/>)

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

I

Industrial and Manufacturing Systems 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/>)

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

N

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

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

P

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

- Pharmaceutical Sciences (<https://www.ndsu.edu/pharmacy/psci/>)
- Pharmacy Practice (https://www.ndsu.edu/pharmacy/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/>)

Academic Policies

North Dakota State University maintains high-quality academic programs through established policies, procedures, rules, guidelines, and regulations. Students and employees are responsible for adhering to these standards, published both in this document and on the NDSU website. These measures ensure NDSU's compliance with federal and state regulations, as well as the quality standards of the Higher Learning Commission (HLC).

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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 undeclared 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 Catalog 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.

Bison Advise (<https://career-advising.ndsu.edu/bisonadvise/>) is an interactive advising and planning tool for students and advisors to plan a path to graduation and schedule and track academic advising interactions. The planning tool within Bison Advise 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 academic college has a Degree and Records Analyst (<https://www.ndsu.edu/registrar/office/analysts/>) in the Office of Registration and Records who serves as the primary contact for supporting academic advising for faculty and professional advisors working with undergraduate students, including those in pharmacy programs.

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. Advising staff will confirm a student's interests during advising appointments 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

Standard Semester

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. 27).

Mid-term of a standard semester is approximately 40 class days after the standard semester start. See also mid-term grading (p. 33).

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 two final examinations scheduled for the same calendar day. In the event that a student has three 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

North Dakota State University Policy on Credit Hour Definition and Assignment

I. Purpose: To define and assign credit hours in accordance with the requirements articulated by the United State Department of Education, the Higher Learning Commission (HLC), and the North Dakota State Board of Higher Education (SBHE).

II. Credit Hour Definition: A credit hour represents student work towards intended learning outcomes, verified by evidence of student achievement, approximating:

- a. Instructional Work: 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 15 weeks for one semester, or the equivalent amount of work over a different period of time;
- b. Equivalent Activities: At least an equivalent amount of work as outlined in item II.a. 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.

III. Clock Hour Representation: A clock hour is typically 50 minutes of lecture or structured faculty/student interaction or 2-3 hours of laboratory session each week of the semester (or equivalent).

IV. Delivery Mode Independence: Federal and state credit hour definition apply regardless of delivery method (e.g., self-paced, synchronous online, asynchronous online, hybrid, lecture, seminar, and laboratory).

Academic Honesty and Integrity Policy

I. Purpose: NDSU Policy 335: Code of Academic Responsibility and Conduct (<https://www.ndsu.edu/fileadmin/policy/335.pdf>) establishes the fundamental principles of academic honesty and integrity at North Dakota State University (NDSU), fostering an atmosphere of honesty, trust, and integrity among students, faculty, and staff.

II. Scope: This policy applies to all students, faculty, and staff of North Dakota State University.

III. Policy Statement: With reference to Policy 335: Code of Academic Responsibility and Conduct, NDSU is committed to upholding the highest standards of academic honesty and integrity. Students are expected to submit their own work and to adhere to ethical standards in all academic endeavors. Faculty members are responsible for establishing and communicating clear guidelines concerning academic honesty and expectations within their courses.

IV. Principles:

- Integrity: All members of the NDSU community are expected to act with honesty and integrity in all academic pursuits.
- Responsibility: Students are responsible for their own academic work and for understanding and adhering to the principles of academic honesty. Faculty members are responsible for fostering a culture of academic integrity and for addressing instances of academic misconduct.
- Fairness: Students have the right to be informed when they are suspected of violating academic principles and have the right to a fair opportunity to respond.

V. Responsibilities:

- **Students:**
 - To submit their own original work.
 - To avoid plagiarism, cheating, and other forms of academic dishonesty.
 - To cooperate honestly in all academic activities.
 - To report suspected instances of academic misconduct.
- **Faculty:**
 - To establish and communicate clear guidelines concerning academic honesty and expectations.
 - To address suspected instances of academic misconduct in a fair and timely manner.
 - To report incidents of academic misconduct in accordance with established procedures.

VI. Disciplinary Procedures:

- Faculty members have the prerogative to determine the penalty for prohibited academic conduct within their classes, including but not limited to failing grades for assignments, tests, or courses.
- Faculty members suspecting academic misconduct must issue an "IP" grade by contacting Registration and Records while conducting an investigation.
- Students may not drop a course in which they are formally accused of academic misconduct.
- Students found guilty of academic misconduct are prohibited from forfeiting, withdrawing, or dropping the associated course.
- Faculty must report instances of academic misconduct using the Student Academic Misconduct Report eForm found in Campus Connection.
- Repeat offenses may result in higher sanctions, including suspension or expulsion, as recommended to the Provost and Committee on Academic Standards.

VII. Resources: The Honesty and Integrity website (<https://www.ndsu.edu/academichonesty/>) details information regarding NDSU's academic honesty and integrity, student expectations, disciplinary sanctions, appeal procedures, and hearing guidelines. NDSU Policy 335: Code of Academic Responsibility and Conduct (<https://www.ndsu.edu/fileadmin/policy/335.pdf>) applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an institutional context and NDSU Policy 326: Academic Misconduct (<https://www.ndsu.edu/fileadmin/policy/326.pdf>) defines various academic misconduct situations.

VIII. Authority: This policy is authorized by the Office of the Provost and is reviewed periodically to ensure its continued relevance and effectiveness.

Class Attendance

NDSU Policy 333: Class Attendance (<https://www.ndsu.edu/fileadmin/policy/333.pdf>) outlines 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: Equal Opportunity and Non-discrimination (<https://www.ndsu.edu/fileadmin/policy/100.pdf>)).

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 ceremonies for students earning bachelor's, master's, or doctoral degrees are held at the end of the fall and spring semesters.

Students who complete their graduation requirements during the summer can participate in the May commencement ceremony of that same calendar year. To be eligible, students must be registered for their remaining summer graduation requirements.

A student can only participate in commencement once for each degree earned. The official date of degree conferral will appear on the academic transcript and diploma, aligning with the university's academic calendar.

To participate in the commencement ceremony, students must reserve their spot by the date specified by the Office of Registration and Records. Orders for caps, gowns, and hoods must be placed by the deadline set by the NDSU Bookstore (<https://www.ndsubookstore.com/>). For more information about commencement, please visit the commencement website (<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_EJRTUx1HoafZYCfqD2MBrVyhonpUFz00nGPLZ1RU7A/?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. Only credits earned at NDSU may be applied to an NDSU certificate of completion.

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. Only credits earned at NDSU may be applied to an NDSU certificate program.

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. 67) 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 Electrical Engineering (B.S.E.E.)
- Bachelor of Science in Environmental Engineering (B.S.Env.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 Agriculture (M.Ag.)
- 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. Agribusiness	M.S. Agribusiness & Applied Economics
B.S. Agricultural Economics	M.S. Agribusiness & Applied Economics
B.S.A.B.En. Agricultural and Biosystems Engineering	M.S. Agricultural and Biosystems Engineering
B.S. Animal Science	M.P.H. Public Health
B.S. Biochemistry & Molecular Biology	M.S. Biochemistry
B.S. or B.A. Biological Sciences	M.S. Biology
B.S. Biotechnology	M.S. Microbiology
B.S. Chemistry	M.S. Chemistry
B.S.C.E. Civil Engineering	M.S.CVE. Civil Engineering
Minor Coatings & Polymeric Materials*	M.S. Coatings & Polymeric Materials
B.S.Con.E. Construction Engineering	M.S. or M.Cons.M. Construction Management
B.S.Con.E. Construction Engineering	M.S.CVE. Civil Engineering
B.S.Cons.M. Construction Management	Master of Business Administration
B.S.Cons.M. Construction Management	M.S. or M.Cons.M. Construction Management
B.S.Cpr.E. Computer Engineering	M.S. or M.Engr. Electrical & Computer Engineering
B.S. Computer Science	M.S. Computer Science
B.S. or B.A. Criminal Justice	M.S. Criminal Justice
B.S. Crop and Weed Science	M.S. Plant Sciences
B.S. Crop and Weed Science	M.S. Plant Pathology
B.S. or B.A. Economics	M.S. Agribusiness & Applied Economics
B.S.E.E. Electrical Engineering	M.S. or M. Engr. Electrical & Computer Engineering
B.S. Disaster Resilience and Emergency Management	M.P.H. Public Health
B.S. Disaster Resilience and Emergency Managmeent	M.S. Community Planning and Resilience
B.S. Exercise Science	M.A.Trg. Athletic Training
B.S. Food Science	M.S. Cereal Science
B.S. Health Services	M.P.H. Public Health
B.S. Horticulture & Urban Agriculture	M.S. Horticulture & Urban Agriculture
B.S. Human Development & Family Science	M.S. Human Development & Family Science
B.S.I.E.Mgt. Industrial Engineering and Management	Master of Business Administration
B.S. Mathematics	M.S. Mathematics
B.S.M.E. Mechanical Engineering	M.S. Mechanical Engineering
B.S. Microbiology	M.S. Microbiology
B.S. Microbiology	M.P.H. Public Health

B.S. Natural Resources Management	M.N.R.M Natural Resources Mgt. (not eligible with the M.S. in NRM)
B.S. Nutrition Science	M.S. Dietetics
B.S. Nutrition Science	M.P.H. Public Health
B.S. Nutrition Science	M.S. Health, Nutrition and Exercise Science - Exercise Science & Nutrition option
B.S. or B.A. Physics	M.S. Physics
B.S. or B.A. Political Science	M.P.P. Public Policy
B.S. Psychology	M.P.H. Public Health
B.S. Sport Management	M.S. 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 Course Substitution
Open Electives	UGRD Academic Major
Optional Minor	UGRD Academic Minor
Required Minor	UGRD Academic Minor
Major	UGRD Academic Major

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

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.

NDSU does not grant credentials or degrees retroactively.

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.

Family Educational Rights and Privacy Act (FERPA) at NDSU

- I. Purpose:** This policy established North Dakota State University's commitment to protecting the privacy and confidentiality of student education records in accordance with the Family Educational Rights and Privacy Act of 1974 (FERPA), as amended.
- II. Scope:** This policy applies to all student education records maintained by NDSU and to all students enrolled at the university.
- III. Policy Statement:** NDSU is committed to maintaining the privacy and confidentiality of student education records in accordance with the provisions of FERPA. As a part of this commitment, students have the following rights pertaining to their educational records at the university:
- IV. Student Rights:**
- **Right to Inspect and Review:** Student have the right to inspect and review their education records within 45 days of the day the University receives a request for access.
 - **Right to Amend:** Students have the right to request the amendment of their education records that they believe are inaccurate, misleading, or otherwise in violation of their privacy rights.
 - **Right to Consent to Disclose:** Students have the right to consent to disclosures of personally identifiable information contained in tehir education records, except to the extent that FERPA authorizes disclosure without consent.
 - **Right to Restrict Directory Information:** Students have the right that personally identifiable information, or directory information, not be made public.
 - **Right to File a Complaint:** Students have 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
- V. Implementation:** FERPA takes effect when classes begin during a student's first enrolled semester.
- VI. Compliance:** This policy is established to ensure compliance with the Family Educational Rights and Privacy Act of 1974 (FERPA), as amended.
- Authority:** This policy is authorized by the U.S. Department of Education.
- Review:** This policy will be reviewed periodically by the Office of Registration and Records to ensure its continued relevance and effectiveness and compliance with any changes to FERPA.

Date of Last Review:

Spring 2025

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. 40) 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 processed, it may not be changed back to a regular letter grade.
4. A grade of 'P' is without honor points and is not included in the grade-point computation; however, a grade of 'F' is included in the grade-point computation.
5. If a course is taken for a regular grade, it cannot be repeated on a pass/fail basis.

Mid-Term Grading

As an early intervention effort to improve retention and academic progress of students, faculty are encouraged to enter deficient mid-term grades of D and F, at minimum, in undergraduate courses. Notifications are sent to students with reported deficient mid-term grades. 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>).

Metro College Alliance

Metro College Alliance (MCA; formerly Tri-College University) is a consortium of five regional institutions of higher education:

- North Dakota State University, Fargo, ND
- Concordia College, Moorhead, MN
- Minnesota State University, Moorhead, MN
- Minnesota State Community and Technical College, Moorhead, MN

- North Dakota State College of Science, Wahpeton, ND

Undergraduate students across the five consortium schools can take advantage of each institution's unique strengths, both individually and collaboratively. The MCA course exchange allows students to enroll in undergraduate courses at other campuses (provider institution) that are not offered at their home institution without additional tuition cost (see tuition and fees section below) or separate admissions processes. This expands the range of disciplines and course availability for students beyond their home campus. Detailed information of the following information can be found on the Metro College Alliance Registration website (<https://www.ndsu.edu/onestop/registration/alliance/>) or in the Course Exchange Agreement (<https://www.ndsu.edu/sites/default/files/onestop/forms/course-exchange-agreement.pdf>).

Tuition and Fees

Tuition is paid to the student's home campus; the institution where the student will earn their degree. No additional tuition may be charged except if the provider institution has course specific fees in place for all students enrolled in the course that cover supplemental costs such as laboratory/studio fees, materials/supply cost fees, or supplement cost for courses in specialized programs. Students would be responsible to pay course specific fees directly to the provider institution offering the course.

Limitations

A student must be enrolled in at least one class at the home institution before being eligible to enroll in the MCA course exchange at a provider institution. A student may only take courses at an MCA provider institution if that course (or it's equivalent) does not appear in the home campus' catalog. No more than two courses may be taken through the MCA course exchange per semester. The MCA exchange is available during the fall and spring semesters only; summer is not eligible. Courses that require selective admission to a program or have a professional component are not included in the MCA course exchange process. Students may not use the course exchange to enroll in international travel programs, music lessons and music ensembles, research courses, independent studies, internships, externships, co-operative courses, and/or work-based learning experiences. A student may not audit a course through the MCA course exchange.

Credits and Grades

When a student takes courses at a provider institution, the courses and grades are recorded on the student's home institution transcript, counting towards degree completion and residency requirements, and factoring into their home institution GPA.

Academic Schedules and Deadlines

Students are responsible for understanding and following the academic calendars of both their home and provider institutions. This includes all important dates such as holidays, semester breaks, and finals week. Deadlines for registration, course add/drop, pass/fail requests, and semester withdrawals align with the home institution's calendar. Additionally, students must be aware of deadlines for courses that don't follow a standard semester length.

Registration

The MCA course exchange registration form is available on the Metro College Alliance Registration website (<https://www.ndsu.edu/onestop/registration/alliance/>). Course pre-requisites will be upheld; the student is responsible for successful completion of any course pre-requisites **before** applying to take a class. Refer to the provider institution's course descriptions for information. If a provider institution's course requires instructor permission to enroll, the student must contact the instructor for written authorization in advance and submit to the home institution. Links to the member institutions academic calendars and schedules is available on the MCA website.

Bus and Parking Services

Member institutions shall provide designated parking facilities to students enrolled through the MCA course exchange with a valid parking pass from the home institution. Parking information can be found on the MCA website. In addition, local bus schedules are available at MATBUS (<http://www.matbus.com/>).

Military and Veteran Certification

The Military and Veterans Certification Office at North Dakota State University (NDSU) serves as a dedicated resource for military-affiliated students, including veterans, active-duty service members, reservists, National Guard members, and their dependents. The office assists with the certification of education benefits through the U.S. Department of Veterans Affairs and other military education programs. In addition to benefit processing, the office provides guidance on eligibility, academic progress requirements, and campus resources tailored to the unique needs of military-affiliated students. Committed to fostering student success, the office collaborates closely with academic departments and support services to ensure a smooth transition to university life and continued progress toward educational goals.

Contact Information:

Office Location: 112 Morrill Hall

Physical/Delivery Address: 1230 Albrecht Boulevard, Fargo, ND 58102

Phone: 701-231-7985

Email: ndsu.veterans@ndsu.edu

Website: www.ndsu.edu/veterans

Project 65

Individuals aged 65 or over may audit one course per semester free of tuition and related mandatory fees as outlined within North Dakota State Board of Higher Education Policy 805.3: Fees (https://ndusbpos.sharepoint.com/:w/s/NDUSPoliciesandProcedures/EXZY1ANs-3IDtaHaQ4tJxKIBX3yID19gla4hSi_pLCh79Q/?rtme=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. 25)). 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 of modes. The course delivery mode is assigned to each class and can be viewed on the schedule when the student is enrolling for classes. NDSU instruction modes include:

- **On Campus Face to Face (traditional classroom)** - The instructor and students are physically located in the same place and may incorporate the use of multiple supportive technologies as appropriate.
- **Hybrid/Blended Combination** - Instruction that is a blend of traditional classroom instruction with online distance education. All students meet on campus for lectures or presentations on specific days and complete the rest of their coursework via a learning management system. Instructors decide how students participate.
- **Independent Study** - Instruction is provided in a self-study, self-paced format where the instructor and student mutually established methods of communication.
- **Off Campus Face to Face** - 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).

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://powerforms.docusign.net/ced14cc1-8fb7-4bf0-887a-faa2f8dd8190/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&recipientLang=en>) 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/>).

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).

Summer 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.

Course Repeat Policy

I. Purpose: This policy outlines the course repeat process for grade improvement.

II. Scope: This policy applies to all currently enrolled students who have not yet earned a degree and are attempting to improve a grade in a course. It also covers how NDSU will handle a course that is repeated at another institution.

III. Definitions

- **Course Repeat:** The act of retaking a course that is already recorded on a student's NDSU academic transcript, with the goal of improving the grade.
- **Cumulative GPA (CGPA):** A student's overall grade point average. At NDSU, a student's CGPA is calculated on NDSU coursework only; transfer credit is not calculated into the CGPA.
- **Repeating a Course at Another Institution:** A student who attends another institution to repeat a class that was taken at NDSU for which a letter grade (A, B, C, D or F) was issued.

IV. Policy

1. Credit Applicability

- Credit for a course can be applied to degree requirements only once, unless explicitly stated otherwise on the official curriculum (major requirements) or in the course description.
- The option to repeat a course for grade and CGPA improvement is available only to students who have not yet 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 credits and honor points will be excluded from cumulative credits and CGPA, and the repeated course will be marked "Repeated: Post Degree-Not Included in Cum Totals."

2. Repeating a Class at NDSU

- When a student repeats a course previously taken at NDSU, only the grade, credits, and honor points from the most recent attempt are calculated into the cumulative GPA and applied to degree requirements.
- Prior attempts will remain on the student's transcript, but the transcript will display "Repeat Excluded" for all prior attempts and "Repeat Included" for the most recent attempt.

3. Repeating a Class at Another Institution

- NDSU's standard transfer credit policy applies to courses repeated at other institutions. The repeat course credit is recorded on the NDSU transcript, but the grade and honor points are not calculated into the NDSU CGPA. The credit is displayed in a cumulative credit block with the transfer institution's name at the start of the NDSU transcript.
- The original NDSU course is displayed as "Repeat Excluded" on the NDSU transcript, but its credit and honor points are removed from the NDSU cumulative GPA calculation.

4. Number of Repeats

- Students may repeat any courses unless an academic department has established specific restrictions and those restrictions are clearly documented on the student's declared official curriculum.

5. Grading Basis

- Courses initially completed with a letter grade cannot be repeated using the Pass-Fail grading basis.

V. Procedures

- The Registrar's Office is responsible for implementing this policy and maintaining accurate student academic records.
- Students are strongly encouraged to consult with their academic advisors to understand the implications of repeating a course.

VI. Responsibilities

- **Students:** To understand and comply with this policy.
- **Academic Advisors:** To advise students on the implications of course repetition.
- **Registrar's Office:** To implement and enforce this policy, maintain the students' academic record, including CGPA's.
- **Academic Departments:** To define and document on official curriculum any curricular restrictions to repeating courses.

VII. Enforcement and Consequences

- Repeating courses can affect financial aid eligibility and satisfactory academic progress. Students should consult with the Financial Aid Office to understand these potential impacts.

Review and Revision: This policy is reviewed annually by Registration and Records and updated as needed by the University Curriculum Committee.

Approval and Effective Date: 01/20/2025 approved by the University Curriculum Committee; and 02/10/2025 approved by Faculty Senate. Effective date: 03/01/2025.

Student Appeals, Complaints, and Grievances

To ensure student success, the university offers comprehensive academic policies outlined in the catalog, promoting a transparent and supportive learning environment. These policies aim to ensure that students are treated equitably by setting clear rules and guidelines. Policies also provide a framework for consistent decision-making and action, and reduce arbitrary or biased decisions. Understanding that individual circumstances vary, the university provides an appeal process for students with verifiable extenuating circumstances, and a complaint/grievance process through the Office of the Provost.

I. Purpose:

This procedure outlines the steps for addressing student appeals, complaints and grievances, ensuring fair and timely resolution.

II. Scope

This procedure applies to all student enrolled at North Dakota State University.

III. General Principles:

- **Direct Resolution:** Encourage initial attempts at direct resolution between involved parties.
- **Escalation:** Provide clear channels for escalation when direct resolution fails (i.e. appeals, complaints, and grievances).
- **Confidentiality:** Maintain appropriate confidentiality throughout the process.
- **Fairness and Impartiality:** Ensure fair and impartial handling of all complaints.

IV. Procedure Steps:

A. General Resolution Steps:

1. Initial Direct Contact:

- The student must first attempt to resolve the concern directly with the individual(s) or the office involved (e.g. instructor, office that manages the policy/procedure).
- Utilize communication methods such as NDSU email, phone, or face-to-face meeting. NDSU maintains a campus directory on the NDSU website.
- Review the policy/procedure associated with the situation.

2. Escalate if Necessary (Appeal):

- If direct contact is unsuccessful, the student may proceed to the specific resolution channels outline in Section IV.B.

3. Formal Complaint to Provost's Office (Complaint/Grievance; Last Resort):

- If all other resolution attempts fail, the student may submit a formal complaint or grievance to the Office of the Provost using the designated online form (see section IV.C.)

B. Specific Scenarios and the Office to Contact:

1. Course Instruction (including final grade dispute) or Academic Advising:

- Step 1: Student attempts resolution with the instructor or advisor.
- Step 2: If unresolved, student contacts the Department Chair or Head.
- Step 3: If unresolved, student contacts the Dean or the relevant College.
- Step 4: If unresolved, student contacts the Office of the Provost.
- NOTE: If this is a final grade dispute, student should refer to NDSU Policy 337: Grade Appeal Board (https://www.ndsu.edu/policy/section_3_non_banded_staff_employment_faculty_and_other/).

2. Academic Misconduct:

- Step 1: Student resources may be found on the Standards for Academic Honesty and Integrity (<https://www.ndsu.edu/academichonesty/>) website, including NDSU Policy 335: Code of Academic Responsibility and Conduct (https://www.ndsu.edu/policy/section_3_non_banded_staff_employment_faculty_and_other/) .

3. Roommate or Housing Situations:

- Step 1: Student contacts Residence Life (https://www.ndsu.edu/residence_life/)

4. Degree Progress:

- Step 1: Student may contact either their academic advisor or Registration and Records (<https://www.ndsu.edu/registrar/>).

5. Academic Policy:

- Step 1: Student contacts Registration and Records (<https://www.ndsu.edu/registrar/>)
- Step 2: If an appeal is warranted due to extenuating circumstances, the student will review and follow the published appeal form (<https://www.ndsu.edu/onestop/forms/>) for the situation.

6. Tuition and Fees:

- Step 1: Student contacts One Stop (<https://www.ndsu.edu/onestop/>).
- Step 2: If an appeal is warranted due to extenuating circumstances, the student will review and follow the published appeal procedures (<https://www.ndsu.edu/onestop/account/appeal/>).

7. Parking:

- Step 1: Student contacts Parking and Transportation Services (<https://www.ndsu.edu/parking/>).
- Step 2: Student reviews the Student Parking page for rules, regulations and citation appeals.

8. Safety and Security:

- Step 1: Emergency: Student dials 911.
- Step 1: Non-Emergency: Student contacts the University Police and Safety Office (https://www.ndsu.edu/police_safety/).
- Step 2: Optional: Student may schedule an appointment with the Counseling Center (<https://www.ndsu.edu/counseling/>) or Student Health Service (<https://www.ndsu.edu/studenthealthservice/>).

9. Student Employment:

- Step 1: Student contacts the supervisor of the employment experience.
- Step 2: (Work-Study): If unresolved, student contacts Financial Aid (<https://www.ndsu.edu/onestop/finaid/>).
- Step 2: (Internship/Co-op): If unresolved, student contacts the Career and Advising Center (<https://career-advising.ndsu.edu/>).
- Step 2: (University Employment): If unresolved, student contacts Human Resources (<https://www.ndsu.edu/hr/>).

10. Discrimination, Harassment, or Sexual Violence (including Title IX complaints):

- Step 1: Student files a complaint with the Equity Office (<https://www.ndsu.edu/equity/>).
- Step 2: Student reviews associated policies.

11. Another Student's Behavior:

- Step 1: Student attempts direct resolution.
- Step 2: If unresolved, student contacts the Dean of Students Office (<https://www.ndsu.edu/deanofstudents/>) and completes the Concern and Complaint Form.
- Step 3: Student reviews the NDSU Policy 601: Rights and Responsibilities: A Code of Student Conduct (https://www.ndsu.edu/policy/section_6_student_affairs/).
- Step 4: Student schedules an appointment with the Dean of Students Office.

12. State Authorization (Distance Learning):

- Step 1: For questions regarding state authorization for distance courses, students may visit the One Stop page on State Authorization (<https://www.ndsu.edu/onestop/registration/authorization/>) for general questions.
- Step 2: (Institutional Level Grievance): Student follows the general complaint resolution procedure outlined in V.
- Step 3 (State Level SARA Grievance): If unresolved at the institutional level, the student contacts the North Dakota University System (NDUS) State Authorization Reciprocity Agreement (SARA) Portal Agency.
 - Contact: Claire Gunwall, NDUS - Director of Academic Affairs
 - Address: 600 E. Boulevard Avenue, Dept. 215, Bismarck, ND 58505-0230
 - Phone: 701-328-4140
 - Email: stateauth@ndus.edu
- Step 4: (Home State): If institutional and SARA resolution fails, students enrolled in online courses from outside North Dakota may file a complaint with their home state's relevant agency.

C. Filing a formal complaint or grievance with the Office of the Provost:

If an issue or a concern has not been resolved or adequately addressed by contacting the office that oversees the scenario from the list in section IV.B., students may reach out to the Office of the Provost to file a formal complaint or grievance. Provide the following in an email to the Office of the Provost and a representative from the Office of the Provost will contact you within one business day:

- Your name, student ID number, and your NDSU email address (name@ndsu.edu).
- A clear description of the issue and a summary of your previous attempts to resolve it, including individuals contacted for assistance.
- The resolution you are seeking.

V. Responsibilities:

- Student: Initiate and pursue appeals and resolutions in a timely and appropriate manner.
- University Personnel: Address appeals and complaints fairly, impartially, and according to this procedure.
- Office of the Provost: Oversee the complaint/grievance procedure and ensure compliance.

VI. Review and Revision:

This procedure will be reviewed and revised periodically to maintain effectiveness and compliance.

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 eligible) 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. 33).

Undergraduate Policies

Credit by Examination (p. 45)

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

English and Mathematics Placement (p. 51)

General Education (p. 55)

- General Education Category Descriptions
- Learning Outcomes
- Administrative Policies
- Gen Ed Courses
- NDUS GERTA Agreement

Undergraduate Classification (p. 65)

Undergraduate Degree & Graduation Requirements (p. 65)

- Baccalaureate Degree and Graduation Requirements
- Major/Minor/Certificate Requirements
- Bachelor of Arts Requirement Using a Second Language
- Graduation with Honor
- Official Degree Audits

Transfer and Test Credit (p. 69)

- 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. 70)

- Academic Progress
- Dean's List
- Academic Forgiveness

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/>)
- North Dakota University System Financial Obligation Agreement (FOA) (<https://www.ndsu.edu/onestop/finaid/agreement/>)

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 & S
Biology	4	BIOL 150, BIOL 150L, BIOL 151, & BIOL 151L	8	S, S, S, & S
Precalculus	3	MATH 107	4	R
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
Chemistry	4	CHEM 121, CHEM 121L, CHEM 122, & CHEM 122L	8	S, S, S, & S
Chinese Language & Culture	3	Free Elective (TRANSFR 1XX)*	3	A/D
Comparative Government & Politics	3	POLS 225	3	B
Computer Science A	3	CSCI 160	4	S
Computer Science AB	3	CSCI 160 & CSCI 161	8	S & S
Computer Science Principles	4	CSCI 159	3	R
English Language & Composition	3	ENGL 110 (or ENGL 112)	3	C
English Literature & Composition	3	ENGL 220	3	A/D
English Literature & Composition	4	ENGL 110 & ENGL 220	6	C & A/D
Environmental Science	3	BIOL 124 & BIOL 100L	4	S/G & S
European History	3	HIST 101 & HIST 102	6	A & A
French Language & Culture	3	FREN 101 & FREN 102	8	A/D & A/G
German Language	3	GERM 101 & GERM 102	8	A/D & A/G
Human Geography	3	GEOG 151	3	B/G
Italian Language & Culture	3	Free Elective (TRANSFR 1XX)*	3	A/D
Japanese Language & Culture	3	Free Elective (TRANSFR 1XX)*	3	A/D
Latin	3	Free Elective (TRANSFR 1XX)*	3	A/D
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
Physics I: Algebra-Based	4	PHYS 211 & PHYS 211L	4	S & S
Physics II: Algebra-Based	4	PHYS 212 & PHYS 212L	4	S & S
Physics C - Electricity & Magnetism	3	PHYS 212 & PHYS 212L	4	S & S
Physics C - Electricity & Magnetism	4	PHYS 252 & PHYS 252L	5	S & S
Physics C - Mechanics	3	PHYS 211 & PHYS 211L	4	S & S
Physics C - Mechanics	4	PHYS 251 & PHYS 251L	5	S & S
Psychology	3	PSYC 111	3	B
Research	3	Free Elective (TRANSFR 1XX)	3	
Seminar	3	Free Elective (TRANSFR 1XX)	3	
Spanish Language	3	SPAN 101 & SPAN 102	8	A/D & A/G
Spanish Literature & Culture	3	Free Elective (SPAN 1XX)*	3	A
Statistics	3	Free Elective (STAT 1XX)*	3	R

Statistics	4	STAT 330	3	R
Studio Art-2D Design Portfolio	3	ART 122	3	A
Studio Art-3D Design Portfolio	3	ART 124	3	A
Studio Art-Drawing Portfolio	3	ART 130 & ART 230	6	A & A
U.S. Government & Politics	3	POLS 115	3	B
U.S. History	3	HIST 103 & HIST 104	6	A & A
World History: 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	Digital Literacy
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.

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 & S
Precalculus	50	MATH 107	3	R
Calculus	50	MATH 146	4	R
Chemistry	50	CHEM 121 & CHEM 121L	4	S & S
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	
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	Digital Literacy
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 Management	46	Free Elective (TRNSFR 1XX)*	3	
Human/Cultural Geography	47	GEOG 151	3	B/G
Intro to the Modern Middle East	47	Free Elective (TRNSFR 1XX)*	3	
Intro to Business	400	Free Elective (TRNSFR 1XX)*	3	
Intro to Computing	400	Free Elective (TRNSFR 1XX)*	3	
Intro to Law Enforcement	45	Free Elective (TRNSFR 1XX)*	3	
Lifespan Development Psychology	46	PSYC 250	3	B
Management Information Systems	400	Free Elective (TRNSFR 1XX)*	3	
Money & Banking	48	Free Elective (TRNSFR 1XX)*	3	
Organizational Behavior	48	Free Elective (TRNSFR 1XX)*	3	
Personal Finance	400	Free Elective (TRNSFR 1XX)*	3	
Physical Geology	46	Free Elective (GEOL 1XX)*	3	S/G
Principles of Finance	400	Free Elective (TRNSFR 1XX)*	3	
Principles of Financial Accounting	49	ACCT 200	3	
Principles of Statistics	48/400	Free Elective (STAT 1XX)*	3	
Principles of Supervision	400	Free Elective (TRNSFR 1XX)*	3	

Rise and Fall of Soviet Union	45	Free Elective (HIST 1XX)*	3	
Substance Abuse	400	PSYC 212	3	B

* Credit received applies toward degree elective credit

General Education Categories:

A	Humanities & Fine Arts
B	Social & Behavioral Science
C	Communication
D	Cultural Diversity
F	First Year Experience
G	Global Perspectives
L	Digital Literacy
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.getcollegedcredit.com (<http://www.getcollegedcredit.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, S, S, S
HL Business Management	4	Free Elective (TRANSFR 1XX)*	3	
HL Chemistry	4	CHEM 121, CHEM 121L, CHEM 122, CHEM 122L	8	S, S, S, S
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	Digital Literacy
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/Eacm2xutfb9Gp5S8P5GL4b0BrUq5pIRVB4u5pNSIF4YjfQ/?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

As part of NDSU's general education requirements, all students must successfully earn credit for **ENGL 110** and **ENGL 120** or their equivalents. To help you get started in the right English course, we use a variety of placement methods.

- **Multiple Placement Scores:** If you have scores from more than one approved English placement exam, we'll always use the score that gives you the highest placement.
- **Accommodations for Students with Disabilities:** If you are an eligible student with a disability and require reasonable accommodations to take a placement test, please contact the **NDSU Center for Accessibility and Disability Services**. You'll need to submit your disability documentation at least two weeks before you plan to take the test. They will review your documentation and let you know if more information is needed to determine your eligibility. You can send your request and documentation to:

NDSU Center for Accessibility and Disability Services Dept. 2860 P.O. Box 6050 Fargo, ND 58108-6050 (701) 231-8463
- **NDSU English Placement Survey:** If you haven't submitted scores from any of the approved English placement examinations (listed in the table below), you'll need to take the **NDSU English Placement Survey**. If you have questions about the survey, please contact **NDSU One Stop**.
- **Challenging Your Placement:** If you have existing placement scores but want to try and place into a higher English course, you may choose to take the **NDSU English Placement Survey**. Keep in mind that **ENGL 120** is the highest English course you can place into through this method.
- **Developmental English (ASC 85):** If your placement indicates that you need to take **ASC 85** (developmental English), you'll register for this course through a collaborative student registration process with **North Dakota State College of Science (NDSCS)**. You can purchase textbooks for ASC 85 at the **NDSU bookstore**.
- **Earning ENGL 110 Credit:**
 - Once you successfully complete **ENGL 120** with a grade of 'C' or higher, you'll be awarded 3 placement credits for **ENGL 110**.
 - If you transfer **ENGL 120** to NDSU with a grade of 'C' or higher, you will also be awarded 3 placement credits for **ENGL 110**.
- **Transferring ENGL 110 with a Non-Passing Grade:** If you've transferred in **ENGL 110** but received a non-passing grade, you have the option to take the **NDSU English Placement Survey**.
- **MELAB Scores:** Students with a MELAB score should contact the **IELP coordinator** for specific information regarding English placement.

NDSU English Placement Survey Scoring Guide
Score Range 1-8: ASC 085

Score Range 9-10: ASC 085 OR English 112 (choice; English 110 if 112 not offered)

Score Range 11-12: ASC 085 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

To ensure you start in the right math course, North Dakota State University (NDSU) uses a variety of approved placement examinations. Here's what you need to know about determining your math placement:

- **Multiple Scores:** If you have scores from more than one approved exam, we'll use the score that gives you the highest placement.
- **Students with Disabilities:** If you're an eligible student with a disability and need accommodations for a placement test, please contact the **NDSU Center for Accessibility and Disability Services** at least two weeks before you plan to take the test. You'll need to submit disability documentation for review. You can reach them at: NDSU Center for Accessibility and Disability Services Dept. 2860 P.O. Box 6050 Fargo, ND 58108-6050 (701) 231-8463
- **First-Year Students:** All incoming first-year students will complete a **Math Placement Survey** to determine their initial course placement. If you wish to challenge this placement, you can take the **NDSU Pearson Placement Exam**.
- **Transfer & Returning Students:** If you're a transfer student or an NDSU student returning after an absence, you **must** take the **NDSU Pearson Placement Exam** to determine your course placement.
- **Challenging Your Placement:**
 - If you've already met the minimum score for any approved placement exam, but want to try and place into a course above MATH 103 or MATH 104, you can choose to take the **NDSU Pearson Placement Exam**.

- If you don't meet the minimum score on any approved placement exam, you'll initially place into MATH 98. However, you can opt to take the **NDSU Pearson Placement Exam** to attempt to place into a higher course.
- **Important Note for Pearson Placement Exam:** We strongly recommend completing the NDSU Pearson Placement Exam *before* enrolling in MATH 98, MATH 103, or MATH 104. If you take the Pearson Placement Exam *after* enrolling in one of these courses and your placement changes, you must drop the course by the no-record drop deadline for the new placement to be valid.
- **Retake Option:** You have one opportunity to retake the **NDSU Pearson Placement Exam**. This retake must be completed before the last day to add classes in Campus Connection.
- **Questions:** For any questions regarding the **NDSU Pearson Placement Exam**, please contact **NDSU One Stop**.

NDSU Math Placement Survey Scoring Guide

Score Range 10-14: Math 98

Score Range 20-24: Math 103, Math 104, or Math 105

Score Range 30-35: Math 104, Math 105, Math 144, or Math 146

Score Range 40-44: Math 103 or Math 104

Score Range 50-54: Math 165

Score Range 60-64: Math 166:

Score Range 70-74: Math 259 or Math 265

Score Range 100-109: Take NDSU Math Pearson Test

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 $\geq$ 70%	Math 103 or Math 104
Algebra < 60%	Math 103 or Math 104
Algebra $\geq$ 60% AND Trigonometry < 65%	Math 105 or Math 144* or Math 146

Algebra $\geq$ 65% AND Trigonometry 40%-64.9%

Math 165 with Math 105

Algebra $\geq$ 65% AND Trigonometry $\geq$ 65%

Math 165

*Math 144: Mathematics for Business is only available for College of Business majors.

General Education

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

University General Education Requirements

Code	Title	Credits
Category C: Communication		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing ¹		
Category R: Quantitative Reasoning ¹		3
Category S: Science and Technology		10
Category A: Humanities and Fine Arts ¹		6
Category B: Social and Behavioral Sciences ¹		6
Category W: Wellness ¹		2
Category D: Cultural Diversity ^{1,2}		
Category G: Global Perspectives ^{1,2}		
Category L: Digital Literacy ^{1,2}		
Total Credits		39

¹ General education courses may be used to satisfy requirements for both general education and the major, minor, or program emphasis, where applicable. Student should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

² Courses for category D, G, & L are satisfied by completing D, G, & L designated courses in another general education category.

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.
- **Digital Literacy (L)** is the ability to use technology to find information, evaluate sources, create content, and communicate with others effectively.
- **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

Digital Literacy (L) - students will

- Evaluate the accuracy and relevance of digital information
- Integrate digital technology and information into academic inquiry

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, global perspectives, or digital literacy 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 or ENGL 112	College Composition I Multilingual College Composition I	3
ENGL 120 or ENGL 121 or ENGL 122	College Composition II Honors Composition II Multilingual College Composition II	3
COMM 110 or COMM 111	Fundamentals of Public Speaking Honors Public Speaking	3
ECON 356	History of Economic Thought	3
ENGL 320	Business and Professional Writing	3
ENGL 321	Writing in the Technical Professions	3
ENGL 322	Writing and the Creative Process	3
ENGL 324	Writing in the Sciences	3
ENGL 325	Writing in the Health Professions	3
ENGL 326	Writing in the Design Professions	3
ENGL 357	Visual Culture and Language	3
ENGL 358	Writing in the Humanities and Social Sciences	3
ENGL 459	Researching and Writing Grants and Proposal	3
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 121	Artificial Intelligence for Everyone	3
CSCI 160	Computer Science I	4
HDFS 140	Navigating Technology and Family Life	3

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
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
HNES 175	Sport in the Ancient World	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 103	Beginner Spanish for Healthcare	3
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
GLBL 110	Introduction to Global Studies	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
MGMT 141	Travel Management	3
NURS 280	Introduction to Global Health	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
GLBL 311	Global to Personal Wellbeing	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	
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
HNES 175	Sport in the Ancient World	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 103	Beginner Spanish for Healthcare	3
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
CSCI 121	Artificial Intelligence for Everyone	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
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
GLBL 110	Introduction to Global Studies	3
GLBL 311	Global to Personal Wellbeing	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
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	
NURS 280	Introduction to Global Health	3
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

Category L: Digital Literacy

Code	Title	Credits
ENGL 120	College Composition II	3

North Dakota University System General Education Requirements Transfer Agreement

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

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

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

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

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

Undergraduate Classification

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

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

Undergraduate Non-degree Student

A non-degree student is defined as either:

- A student formally admitted to the university but not currently seeking a degree.
- A student who has not completed the formal admission application (these students may take a maximum of 15 undergraduate credits).

All non-degree students are ineligible for financial aid and are subject to academic standing at the end of each semester.

Undergraduate Degree and Graduation Information

Baccalaureate Degree and Graduation Requirements

NDSU offers a number of baccalaureate degree types; (p. 28) the two most common bachelor's degrees awarded at NDSU are the Bachelor Science (B.S.) and the Bachelor of Arts (B.A.). To receive a baccalaureate (bachelor's) degree, student candidates must satisfactorily complete two sets of requirements. Students are responsible for understanding these requirements and should consult the official curriculum guide (<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. 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, Minors, and Certificates

Majors and minors form a core component of a bachelor's degree. The North Dakota University System (NDUS) State Board of Higher Education (SBHE) Policy and Procedure 409 (<https://ndus.edu/sbhe-overview/sbhe-policies/400-heading-policies/>) outlines the minimum credit requirements for both. Students must adhere to the specific requirements in effect when they formally declare their major or minor with the university. Detailed curriculum information for each major and minor can be found in the undergraduate curriculum (p. 296) section of the university catalog. Certificates are a stand-alone credential and can be completed on their own or in conjunction with a baccalaureate's degree.

Majors

Majors: An undergraduate major represents a structured set of courses within a specific academic area, known as a curriculum, that a student formally commits to studying by declaring it. Each major requires a minimum of 32 semester credits. Furthermore, departments are responsible for ensuring

that each major includes at least 15 credits that are distinct from any other major offered at the University during the development process. While most majors lead to a Bachelor of Science or Bachelor of Arts degree, some specialized degree options exist with specific majors. A comprehensive list of all NDSU degree types can be found in the Degree Types (p. 28) section of the university catalog.

Second or Multiple Majors: Students have the option to pursue a second or multiple majors while earning a Bachelor of Science or Bachelor of Arts degree. In such cases, one major will be designated as the primary major, and the college associated with this primary major will award the degree. To successfully complete multiple majors, students must fulfill all curriculum requirements for each declared major, in addition to meeting all other undergraduate degree requirements. *Important Note:* If a student declares majors with different degree types (e.g., a BA and a BS), the requirements for earning a second degree will apply. Please refer to the Second Degree section below for more information.

After a Bachelor of Science or a Bachelor of Arts degree has been awarded, students can still complete additional majors or minors within that specific degree type. These subsequent majors or minors will be noted as a milestone on the student's academic record after the term in which all requirements are satisfied.

Dual Major: A dual major distinguishes itself from a second or multiple majors by formally integrating two majors into a single, cohesive curriculum. This combined structure typically results in fewer overall required courses compared to pursuing each major separately. Departments seeking to establish a dual major must obtain formal approval through the university's governance process. Students can declare a dual major through the standard major change procedure. Officially approved dual majors are clearly listed in the university catalog's undergraduate curriculum (p. 296) section.

Minors

Minor: Minors are focused programs of study within an academic discipline that undergraduates can choose to declare to enrich their bachelor's degree. Completing a minor requires a minimum of 16 credits, with at least eight of those credits earned through NDSU resident coursework. It's important to note that minors are not independent credentials; they are always awarded in conjunction with a bachelor's degree. A list of eligible minors is available in the curriculum (p. 296) section of the catalog.

Students can also complete additional minors after they have already earned their degree, and these will be noted on their academic record as a milestone following the semester of completion.

Undergraduate Certificates

Undergraduate Certificate: Undergraduate certificate programs offer focused study in a specific area, requiring a minimum of 9 credits. These certificates can be pursued concurrently with a degree program or as a separate, stand-alone program. Details regarding the curriculum for each certificate can be found in the undergraduate curriculum (p. 296) section of the catalog. Individuals interested in enrolling in an undergraduate certificate program must apply to the University through the Office of Admission.

Second Degree

At NDSU, students can pursue a second bachelor's degree type under these conditions:

- Each baccalaureate degree earned must be of a different type (for example, a Bachelor of Science and a Bachelor of Arts, or a Bachelor of Science and a Bachelor of Science in Electrical Engineering). Students cannot earn two degrees of the same type. However, students can complete the requirements for multiple majors within a single degree type, if offered (refer to the Second or Multiple Majors above).
- All curriculum requirements for the second degree must be successfully completed.

Bachelor of Arts Requirement Using a Second Language

The Bachelor of Arts (B.A.) degree at NDSU signifies completion of a major and functional proficiency in a second language, typically demonstrated through at least the intermediate level. This requirement emphasizes practical language skills and a comparative cultural perspective, preparing students for an internationalized world. Proficiency is assessed continuously across 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 of SPAN 202 with a grade of 'C' or better. Note that this requirement cannot be fulfilled by coursework taken pass/fail.
2. For students having previously passed the CLEP Examination (p. 47) 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. 45) with a minimum score of 4 in French, German or Spanish, taking one additional college-level language class at the equivalent of the 202 level or higher in order to demonstrate competency in all four skill levels. Official score reports and/or transcripts must be submitted to the Office of Registration and Records.
3. 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 School of Humanities (<https://www.ndsu.edu/schoolofhumanities/>) for verification. No credit will be awarded. To apply this to degree completion, the School of Humanities would complete and submit a waiver form to the Office of Registration and Records.
4. Students who are unable to provide the documentation mentioned above 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 School of Humanities for a waiver of the Second Language requirement. To apply this to degree completion, the School of Humanities would complete and submit a waiver form to the Office of Registration and Records.

- Requests for determination of proficiency in languages not taught at NDSU are considered by the School of Humanities. 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 for the Commencement Ceremony

The commencement program acknowledges graduation with honor based on completed and in-progress coursework (for residency consideration) and the student's current NDSU cumulative GPA at the time of the ceremony. The specific honor level attained is not announced when the student's name is read during the ceremony.

Official Degree Audits

A degree audit is the university's official assessment of a student's progress toward graduation and their eligibility to graduate. Undergraduate students nearing completion of approximately 70% of their primary major requirements will receive an email from the Office of Registration and Records, prompting them to submit a degree audit request form. A Degree and Records Analyst will then conduct a thorough audit and notify both the student and their academic advisor when the official results are available for review in Campus Connection.

It's important to understand that degree audits are not automatic due to the diverse educational and degree goals of students (e.g., multiple degrees, majors, minors). Failure to submit an official audit request could lead to delays in graduation if crucial requirements are overlooked.

Students have continuous access to tools for monitoring their degree progress. The Academic Requirements Report in Campus Connection provides an automated, real-time audit of all degree requirements. Additionally, students can collaborate with their academic advisors using Bison Advise to create an interactive, semester-by-semester course plan that integrates with the Schedule Planner registration tool. Both resources utilize up-to-date enrollment data, showing completed, in-progress, and remaining degree requirements.

Exceptions to Academic Program Requirements

NDSU's academic policies regarding degree requirements, graduation, transfer credit, and general education, along with official curriculum requirements, are in place to maintain consistently high program quality. Students are expected to fulfill all curriculum requirements for their degree, including overall University requirements (such as general education) and the specific curriculum for their officially declared program.

However, limited exceptions may be approved by the chairperson of the department offering the program. Students can request a course substitution or waiver for a curriculum requirement in consultation with their academic advisor. The advisor initiates this process by completing and submitting a Substitution/Waiver form, which is then sent to the relevant department chairperson or curriculum coordinator for formal approval.

Academic departments are responsible for planning to offer all courses within a major program, enabling students to graduate in a timely manner. If required major courses can no longer be taught, the academic unit has two options to ensure students can complete their degree:

- The department chairperson or curriculum coordinator can file individual substitution/waiver forms for students needing a curricular adjustment.
- The department can request to transition the student to a more recent, updated curriculum within the same major.

Students must be clearly informed about whichever option is chosen.

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 from institutions recognized by the United States Department of Education (https://www2.ed.gov/admins/finaid/accred/accreditation_pg3.html#RegionalInstitutional) or the American Council on Education (ACE) National Guide (<https://www.acenet.edu/National-Guide/Pages/default.aspx>) 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. A student may repeat classes elsewhere that were previously completed at NDSU. The repeat course credits is recorded on the NDSU transcript, but the grades and honor points are not calculated into the NDSU cumulative GPA. Refer to the Repeated Courses (p. 40) policy for complete information.
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. 57).)
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://ndusbpas.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 2.000 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 standards that are higher than the University minimum of 2.000. This information should be clearly outlined on the official major curriculum found in the University Catalog. 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 an administrative intervention that requires a student to stop out for two semesters immediately following the semester of suspension. An academic suspension is issued in the following situations:

1. When a student enters a semester on academic alert or continued alert from a previous semester and earns both a semester GPA and cumulative GPA below 2.000.
2. When a student is admitted to the University on academic alert and earns both a semester GPA and cumulative GPA below 2.000 in the first semester.
3. When a student is readmitted on academic alert following a stop out from a prior academic suspension and earns both a semester GPA and cumulative GPA below 2.000.

A suspension hold is placed on the student's record by the Office of Registration and Record preventing enrollment activity during a future semester. If a student is enrolled in a future semester, this enrollment is removed to ensure tuition and fees are fully refunded. Students are notified of their suspension status via official NDSU email and a copy of this notification is available in the Tasks and Communications tile in Campus Connection. 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 by the semester deadlines listed on the form. The petition is reviewed by a readmission committee. If approved, the student is 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 be familiar with 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.

Academic Suspension from Another Institution

NDSU honors suspensions of other institutions. Students transferring to or returning to NDSU who have been suspended from another institution may not be considered for admission or readmission until one year has lapsed or the suspension from the other institution has been lifted. Students who fail to report all previous college work may be subject to dismissal.

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 Information

Graduate Curriculum (p. 117)

Admission Policies (p. 73)

Graduate College Policies (p. 75)

Graduate Faculty (p. 93)

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. An applicant still completing a baccalaureate degree may apply (assuming they will have completed the degree prior to enrolling in a graduate program).
 - b. The applicant's baccalaureate degree must be equivalent to a four-year baccalaureate degree from the United States.
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 most recent 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. Admission is not guaranteed.

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>.

- Online Application for Graduate Admission
- Statement of purpose
- Resume or C.V.
- \$35 application fee
- Original official transcripts are required to be sent from each institution attended, whether or not a degree was earned, and even if courses were transferred to another university.
 - 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.
- Recommendations (if applicable)
- Other materials/test scores (if required by the program)
- English proficiency language scores (if applicable)

Current graduate students adding a graduate certificate must submit the **Request to Add a Certificate to a Graduate Degree** form and \$35 application fee to apply.

Non-degree seeking applicants must submit the following to complete the application process:

- Online Application for Graduate Admission
- \$35 application fee
- English proficiency language scores if applicable

Additional application requirements are found on the Graduate College website: <https://www.ndsu.edu/graduate-school/graduate-admission/admission-requirements/>

Applying to Multiple Programs

To apply for additional programs, a separate application and additional \$35 fee is required. Previously submitted documents may be used for additional applications; please email ndsu.grad.school@ndsu.edu to confirm if your materials are still valid.

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 (https://www.ndsu.edu/admission/how_to_apply/international/english_proficiency/)**list of exempt countries** is found on the International Student and Study Abroad Services 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 required scores are indicated below. (Select programs require higher minimum scores)
 - Test of English as a Foreign Language (TOEFL): 71 (internet-based)
 - **Duolingo**: 105 (internet-based)
 - International English Language Testing System (IELTS): 6.0 (academic version)

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**).

Students admitted conditionally to a graduate program cannot earn more than 12 graduate credits prior to completing the conditions of admission.

Conditional Standing for Accelerated Students

All accelerated students are admitted conditionally, with the condition that they must complete their Bachelor's degree prior to full standing admission to a graduate program. Some students may have additional conditions on their admission (see information above).

Students admitted to an accelerated degree program may earn up to one-half of their required program's graduate credits while in conditional standing. Students who earn beyond 15 graduate credits 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 typically for individuals who desire to pursue study beyond the baccalaureate degree for personal growth and improvement of skills. 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**, 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 advisor, supervisory committee (if applicable) and the graduate program coordinator.

Delaying Enrollment

Students may delay enrollment for up to one year. To delay enrollment, the **Request to Delay Enrollment form** must be received by the Graduate School prior to the **Enrollment Census date** for the semester in which the student was admitted. Requests received after the deadline will not be processed and the student must reapply for admission.

Graduate College Policies

- General Policies (p. 75)
- Master's Degree Policies (p. 79)
- Doctoral Degree Policies (p. 83)
- Graduate Certificate Policies (p. 87)
- Graduate Assistantship Policy (p. 87)
- English Language Proficiency Procedure for Graduate Teaching Assistants (p. 90)
- Graduate Student Appeals Process (p. 91)

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, ndsueoaa@ndsuh.edu.

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

Admission Status

Full Graduate Standing

These students have met all admission criteria and are fully admitted to a graduate program. Full graduate standing is a prerequisite for the conferral of 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.

- Each program defines specific conditions for students to transition from conditional to full graduate standing.
- Students with an undergraduate CGPA below 3.0 are automatically placed in conditional standing by the Graduate College.
 - **Condition:** Earn a 3.0 or higher CGPA in the first nine didactic graduate credits.
 - **Additional Conditions:** Programs may impose further conditions.
- 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>)).

Credit Limitations:

- Conditional students are limited to earning 12 graduate credits before fulfilling admission conditions.
- Accelerated degree programs may allow students to earn up to half of their required graduate credits while in conditional status.
 - Credits earned beyond 15 while in conditional status may not be eligible for undergraduate financial aid and will be charged at the graduate tuition rate.

Non-Degree Admission

This category is for individuals seeking personal and professional growth through graduate-level coursework without pursuing an advanced degree.

Important Considerations:

- Non-degree students are not eligible for:
 - Graduate assistantships
 - Tuition waivers
 - Federal Title IV student financial aid
- Non-degree students are affiliated with the Graduate College, not a specific academic program.
- Some courses may have prerequisites or require instructor permission.
 - Degree-seeking students have enrollment priority in courses with limited space.

Transitioning to Degree-Seeking Status:

- **Admission Process:** Students wishing to pursue a degree must complete the Graduate College application process (including a new application and fee).
- **Credit Transfer:**
 - A maximum of 10 credits earned as a non-degree student may be applied towards a graduate degree.

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 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.

Good Standing

Good standing is achieved when a student's cumulative GPA is at or above a 3.00.

Academic Warning

Academic warning is issued when a student who entered the grading period on good standing earns a cumulative GPA below the minimum 3.00.

- Any student admitted in conditional status is placed on academic warning starting their first semester.
- Students on academic warning remain eligible for graduate assistantships.
- An academic warning does not appear on the official academic transcript. Students are notified of their academic warning status via official NDSU email.
- Students on academic warning can take a leave of absence from their graduate studies; this will not change their academic standing.

Continued Warning

Continued academic warning is a formal extension of the academic warning status. It is issued when a student entering the grading period on academic warning achieves a minimum semester GPA of 3.00, demonstrating adequate progress, but their cumulative GPA remains below the 3.00 minimum.

- Students on continued warning remain eligible for graduate assistantships.
- Continued warning does not appear on the student's official academic transcript, but does appear on the unofficial transcript. Students are notified of their continued academic warning status via official NDSU email.

Academic Probation

If a student on continued warning fails to achieve a CGPA of at least 3.00, 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** form. This plan must include:

- **Specific Courses:** The courses the student plans to take in the subsequent semester(s).
- **Target Grades:** The grades the student aims to achieve in those courses to raise their CGPA to 3.0 or higher.
- **Improvement Strategies:** An explanation of the specific steps the student will take to improve their academic performance (e.g., study groups, tutoring, improved time management).

The completed Remediation Plan must be received (with all signatures) by the Graduate College before the last day of online registration (<https://www.ndsu.edu/onestop/dates/>) in Campus Connection.

Students on academic probation can take a leave of absence from their graduate studies; this will not change their academic standing. Students on academic probation must submit their remediation plan before requesting a leave of absence.

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.

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

Additional Information:

- Dismissal is confirmed following the completion of any appeal process (p. 91).
- A dismissal is documented on the student's official academic transcript. Students are notified of their dismissal via official NDSU email.
- 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.

Enrollment Requirements for International Graduate Students

Each fall and spring term, international graduate students (those holding an F-1 or J-1 visa) must fully enroll in face-to-face coursework. If an international student holds a graduate assistantship contract, full-time enrollment is 6 credits minimum. For those students without an assistantship contract, full-time enrollment is 9 credits minimum. Exceptions to these minimum enrollment requirement may be made on a case-by-case basis with pre-approval from both the Graduate School and the International Student and Study Abroad Services office. Failure to comply with the minimum enrollment requirements will result in the loss of legal status as an F-1 or J-1 student visa holder. See the International Student and Study Abroad Services page (<https://www.ndsu.edu/international/iss/immigration/students/credits/>) for additional 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 received by the Graduate College prior to the Enrollment Census date 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 supporting students in balancing their academic pursuits with their family responsibilities. This policy outlines provisions for:

1. Extensions for Completing Academic Requirements

Eligibility:

- Graduate students in good academic standing making progress towards their degree may be eligible for extensions on:
 - Preliminary/Qualifying Examinations
 - Final Defense
 - Disquisition Review Process

Qualifying Circumstances:

- Childbirth, adoption, or foster placement of a child
- Caring for a newborn child
- Caring for a child with a serious medical condition
- Experiencing a serious medical condition
- Caring for a seriously ill spouse/partner or parent (may require medical documentation)

Extension Lengths:

- Childbirth, adoption, foster placement: Up to one extra year
- Serious medical conditions (student, child, spouse/partner, parent): Up to six extra months

Application Process:

- Students must submit the extension request form (https://www.ndsu.edu/gradschool/current_students/forms/#:~:text=Request%20for%20Extension%20Under%20Family%20and%20Medical%20Accommodation%20Policy) to their academic unit *before* the desired extension start date.
 - Retroactive requests will not be considered.
- The academic unit and Graduate School will review the request and determine eligibility.
- 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.
- International students require approval from the Office of International Student and Study Abroad Services.

Leave of Absence:

- Students may also consider a leave of absence from their program.
- International students should consult with the Office of International Student and Study Abroad Services regarding leave of absence eligibility.

2. Modified Duties for Graduate Assistants

Eligibility:

- Graduate assistants who have served at least one academic term may be eligible for modified duties in the following circumstances:
 - Childbirth, adoption, or foster placement of a child
 - A health condition preventing the performance of regular duties (without workload reduction)
 - Caring for a child, spouse/partner, or parent with a serious health condition

Definition and Length of Modified Duties:

- “Modified Duties” means a change to duties and goals without stipend reduction for a limited period. 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.
- Childbirth or adoption of a child under 6.: Up to six weeks
- Serious medical conditions (student, child, spouse/partner, parent): Up to six weeks of excused absences (with appropriate documentation).
- Modified duties agreements must conclude within 12 months.

Application Process:

- Graduate assistants submit a Modified Duties Request (https://www.ndsu.edu/gradschool/current_students/forms/#:~:text=Modified%20Duties%20Request) to be sent to their supervisor and department chair/head.
 - The graduate assistant and department engage in an interactive process to determine modified duties and duration.
 - The dean of the Graduate College will help resolve any disagreements.
 - Performance evaluations will 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.

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 Agriculture (M.Ag.)

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 Health in Epidemiology (M.P.H.Epi)

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

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

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

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.

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.

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.
 - The external member cannot be an affiliate graduate faculty member of the advisor's home department/program.

To add an external member (not full or affiliate graduate faculty) to a graduate committee, attach to the Plan of Study or supervisory committee form:

1. A letter of support from the department chair (program coordinator for interdisciplinary programs), including the expertise this person brings to the committee.
 - a. The letter must come from the department chair (program coordinator for interdisciplinary programs) only, not the advisor.
2. A copy of the external member's curriculum vitae (CV)

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.

Supervisory Committee Meetings

While students will meet with their advisor often, meeting at least once a year with the supervisory committee is recommended.

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.

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, including any qualifying transfer credits (see transfer credit policy below).

- 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.
- up to 10 credits taken as a non-degree NDSU graduate student can be used towards the degree
- 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.
- 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 and filed by the student, the supervisory committee, the graduate program coordinator, and 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 (p. 75)
- 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 (p. 75)
- 2-4 credits of 797 Master's Paper

Plan C Master's Degree

- Minimum 30 credits total

Course Waivers or Substitutions

Course waivers or substitutions may be made with the Waive/Substitute Course eForm. This is an advisor initiated form. Students do not have access to this form.

Transfer of Credit

Transfer of credit is requested at the time a Plan of Study or a [Waive/Substitute Course eForm](#) is filed. 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 defense 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 are 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 Defense

At least seven (7) calendar days prior to the final defense date, the Notification of Scheduled Final Defense 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 Final Defense filed seven calendar 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 Final Defense.

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.

Residency 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.

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.

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 or a qualified off-campus expert in the field.
 - To add an external member (not full or affiliate graduate faculty) to a graduate committee, attach to the Plan of Study or supervisory committee form:
 - i. a letter of support from the department chair (program coordinator for interdisciplinary programs), including the expertise this person brings to the committee.
 - The letter must come from the department chair (program coordinator for interdisciplinary programs) only, not the advisor.
 - ii. a copy of the external member's curriculum vitae (CV)
- The Graduate School Representative (GSR), a full member of the graduate faculty 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 website.

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.

Supervisory Committee Meetings

While students will meet with their advisor often, meeting at least once a year with the supervisory committee is recommended.

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.

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, including

- 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, and the graduate program coordinator and 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.
- 15 credits must be 700-800 level didactic courses
 - Didactic credits requirements do not apply to outcomes-based programs.

Course Waivers or Substitutions

Course waivers or substitutions may be made with the **Waive/Substitute Course eForm**. This is an advisor initiated form. Students do not have access to this form.

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.

For students not using a previous master's degree, 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.

Students using a previous master's degree towards the 90 graduate credits required may also transfer up to 15 credits from another doctoral program in the same or a meaningfully related discipline from an accredited doctoral institution may be allowed in individual cases. Courses taken as a non-degree student are not eligible for transfer.

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 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.

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 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 Preliminary Examination form is required for the oral portion of the preliminary examination. The Notification of Scheduled Final Defense is required for the oral 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 form.

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.

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

Certificate Completion

- Certificate students must meet the same academic standing requirements (<https://catalog.ndsu.edu/graduate/graduate-school-policies/#academicstandardtext>) as degree seeking students.
- Only graduate credits earned at NDSU may be applied to a certificate program.
- Courses used to satisfy the Graduate Certificate program requirements cannot be older than seven (7) years at the time the certificate completion is verified.
- Credits earned toward completion of a certificate also may be used toward the completion of a graduate degree, if allowed by the degree program.
- Courses used for a previously earned NDSU degree cannot later be used towards completion of a graduate certificate.
- Candidates must submit a Graduation Application in Campus Connection (<https://www.ndsu.edu/graduate-school/apply-graduation/>) 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.

Course Waivers or Substitutions

Course waivers or substitutions may be made with the **Waive/Substitute Course eForm**. This is an advisor initiated form. Students do not have access to this form.

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
 - Students on academic warning may maintain an assistantship
- Be enrolled in a minimum of 6 graduate credits during the fall and spring semester
 - This policy does not apply if the student is enrolled in their final graduating semester and needs fewer than 6 credits to complete their plan of study or program curriculum.
 - 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.

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 and student fees. Waivers do not cover audited courses, undergraduate or professional level courses, 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).

Academic College Tuition Waiver Policies

College of Agriculture, Food Systems and Natural Resources

College of Arts and Sciences (https://www.ndsu.edu/artsandsciences/resources/faculty_resources/#:~:text=CAS%20Graduate%20Tuition%20Waiver%20Policy)

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

College of Graduate and Interdisciplinary Studies

College of Engineering

College of Health and Human Sciences

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.

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 respondent(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 Appointments

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.

Aboah, Armstrong, Assistant Professor, Civil, Construction & Environmental Engineering

Ph.D., 2022, University of Missouri-Columbia

Ahmadov, Azar, Professor, Mathematics

Ph.D., 2004, Yale University

Al Asady, Ahmad, Assistant Professor, Management and Marketing

Ph.D., 2020, Kent State University

Aldrich-Wolfe, Laura, Associate Professor, Biological Sciences

Ph.D., 2006, Cornell University

Alfonseca Cubero, Maria, Professor, Mathematics

Ph.D., 2003, Universidad Autonoma de Madrid

Aly Ahmed, Bakr, Associate Professor, School of Design, Architecture + Art

Ph. D., 2001, Virginia Polytechnic Institute and State University

Ambrosio, Thomas, Professor, Political Science

Ph.D. 2000, University of Virginia

Andrianova, Anastasiya, Professor, English

Ph.D., 2011, City University of New York

Anwar, Zahid, Associate Professor, Computer Science

Ph.D., 2002, University of Illinois Champagne- Urbana

Archbold, Carol, Professor, Criminal Justice

Ph.D., 2002, University of Nebraska-Omaha

Arnold, Lisa, Associate Professor, English

Ph.D., 2011, University of Louisville

Asa, Eric, Associate Professor, Civil, Construction & Environmental Engineering

Ph.D., 2000, University of Alberta

Azarmi, Fardad, Professor, Mechanical Engineering

Ph.D., 2008, University of Toronto

Baggett, Ashley, Associate Professor, School of Humanities

Ph.D., 2014, Louisiana State University

Balas, Benjamin, Professor, Psychology

Ph.D., 2007 Massachusetts Institute of Technology

Baldwin, Thomas, Assistant Professor, Plant Pathology

Ph.D., 2013, University of Georgia

Banerjee, Samiran, Assistant Professor, Microbiological Sciences

Ph.D., 2012, University of Saskatchewan

Banerjee, Somnath, Associate Professor, Management and Marketing

Ph.D., 2015, University of Central Florida

Barabanov, Nikita, Professor, Mathematics

Ph.D., 1979, Leningrad University

Barrett, Tracy, Associate Professor, School of Humanities

Ph.D., 2007, Cornell University

Bauer, Marc, Associate Professor, Animal Science

Ph.D., 1996, University of Kentucky

Bauroth, Nicholas, Professor, Political Science

Ph.D., 2003, Loyola University

Beck, Stephenson, Professor, Communication

Ph.D., 2008, University of Kansas

Benton, Bradley, Associate Professor, School of Humanities

Ph.D., 2012, University of California Los Angeles

Berg, Eric, Professor, Animal Science

Ph.D., 1996, Purdue University

Berg, Erika, Associate Professor, Animal Science

Ph.D., 2006, University of Missouri

Berti, Marisol, Professor, Plant Sciences

Ph.D., 2007, North Dakota State University

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Scaff, Taw, Assistant Professor, Animal Science
 Ph.D., 2024, Purdue University
Scaglia, Guillermo, Professor, Animal Science

Ph.D., 2002, Texas A&M University
Schumacher, Leon, Professor, Agricultural & Biosystems Engineering
Ph.D., 1987, Iowa State University
Schwaen, Regin, Associate Professor, School of Design, Architecture + Art
M.Arch., 1992, Arkitekttskolen I. Aarhus
Seaborn, Travis, Assistant Professor, School of Natural Resource Sciences
Ph.D., 2019, Washington State University
Secor, Gary, Professor, Plant Pathology
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, Mechanical Engineering
Ph.D., 2001, Florida A and M University
Selvakumar, Prakash Parthiban, Assistant Professor, Mechanical Engineering
Ph.D., 2012, Nagoya University
Shen, Gang, Associate Professor, Statistics
Ph.D., 2009, Purdue University
Shetty, Kalidas, Professor, Plant Sciences
Ph.D., 1989, University of Idaho
Shume, Teresa, Associate Professor, School of Education
Ph.D., 2013, University of North Dakota
Sibi, Mukund, Distinguished Professor, Chemistry and Biochemistry
Ph.D., 1980, City University of New York
Signor, Sarah, Assistant Professor, Biological Sciences
Ph.D., 2013, University of California, Davis
Singh, Jagdish, Professor, Pharmaceutical Sciences
Ph.D., 1982, Banaras Hindu University, Varanasi, India
Skoy, Elizabeth, Professor, Pharmacy Practice
Pharm.D., 2007, North Dakota State University
Slater, Kelsey, Assistant Professor, Health, Nutrition & Exercise Science
Ph.D., 2021, Mississippi State University
Smith, Angela, Professor, School of Humanities
Ph.D., Middle Tennessee University
Srinivasan, Sudarshan, Professor, Electrical & Computer Engineering
Ph.D., 2007, Georgia Institute of Technology
Stastny, Sherri, Professor, Health, Nutrition & Exercise Science
Ph.D., 2007, North Dakota State University
Steele, Dean, Associate Professor, Agricultural & Biosystems Engineering
Ph.D., 1991, University of Minnesota
Steffen, Kristine, Professor, Pharmaceutical Sciences
Ph.D., 2007, North Dakota State University
Steinbach, Sandro, Associate Professor, Agribusiness and Applied Economics
D.Sc., 2018, Swiss Federal Institute of Technology
Stichman, Amy, Associate Professor, Criminal Justice
Ph.D., 2003, University of Cincinnati
Stockwell, Craig, Professor, Biological Sciences
Ph.D., 1995, University of Nevada-Reno
Strand, Bradford, Professor, Health, Nutrition & Exercise Science
Ph.D., 1988, University of New Mexico
Strand, Mark, Professor, Pharmacy Practice
Ph.D., 2004, University of Colorado at Denver
Strand, Michael, Professor, School of Design, Architecture + Art
M.F.A., 1999, University of Nebraska
Straub, Jeremy, Associate Professor, Computer Science
Ph.D., 2015 University of North Dakota
Striker, Jessica, Professor, Mathematics
Ph.D., 2008, University of Minnesota
Sun, Chengwen, Associate Professor, Pharmaceutical Sciences
Ph.D., 1996, Norman Bethune University of Medical Sciences
Sun, Xin, Associate Professor, Agricultural & Biosystems Engineering
Ph.D., 2013, Nanjing Agricultural University
Suzen, Yildirim, Associate Professor, Mechanical Engineering

Ph.D., 1998, Wichita State University
Swanson, Kendall, Professor, Animal Science
 Ph.D., 2000, University of Kentucky
Swenson, David, Associate Professor, School of Design, Architecture + Art
 Ph.D., 2006, Queens University
Syverson, Eric, Assistant Professor, School of Design, Architecture + Art
 M.F.A., 2014, Minneapolis College of Art and Design
Szmerekovsky, Joseph, Professor, Transportation, Logistics, & Finance
 Ph.D., 2003, Case Western Reserve University
Tangen, Jodi, Associate Professor, Counselor Education
 Ph.D., 2015, University of North Carolina at Greensboro
Tangpong, Chanchai, Professor, Management and Marketing
 Ph.D., 2002, Southern Illinois University, Carbondale
Tangpong, Xiangqing, Associate Professor, Mechanical Engineering
 Ph.D., 2006, Carnegie-Mellon University
Taplin, Brittany, Assistant Professor, School of Design, Architecture + Art
 M.Arch., 2014, North Dakota State University
Templeton, Karisa, Assistant Professor, Division of Performing Arts
 D.M., Indiana University
Theile, Verena, Associate Professor, English
 Ph.D., 2006, Washington State University
Thiel, Brooke, Assistant Professor, Agricultural Education
 Ph.D., 2020, North Dakota State University
Thomas, Laura, Professor, Psychology
 Ph.D., 2008, University of Illinois at Urbana-Champaign
Thompson, Asunta, Associate Professor, Plant Sciences
 Ph.D., 1998, University of Idaho
Thompson, Kevin, Professor, Criminal Justice
 Ph.D., 1986, University of Arizona
Thompson, Rachel, Assistant Professor, Accounting & Information Systems
 Ph.D., University of Minnesota
Tian, Ruilin, Professor, Transportation, Logistics, & Finance
 Ph.D., 2008, Georgia State University
Tida, Umamaheswara Rao, Assistant Professor, Electrical & Computer Engineering
 Ph.D., University of Notre Dame
Travers, Steven, Associate Professor, Biological Sciences
 Ph.D., 1998, University of California, Santa Barbara
Ubhaya, Vasant, Professor, Computer Science
 Ph.D., 1971, University of California-Berkeley
Ulven, Chad, Professor, Mechanical Engineering
 Ph.D., 2005, University of Alabama, Birmingham
Uppala, Vishal, Associate Professor, Accounting & Information Systems
 Ph.D., University of North Carolina at Greensboro
Varland, Rooth, Professor, Division of Performing Arts
 M.F.A., 1989, Northwestern University
Vettern, Rachelle, Professor, Ext Ctr for 4-H Youth Dev
 Ph.D., 2006, North Dakota State University
Visilia, Anna Maria, Associate Professor, School of Design, Architecture + Art
 Ph.D., 1996, University of Pennsylvania
Vold, Jessica, Assistant Professor, 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, Coatings & Polymeric Materials
 Ph.D., 1994, Lviv Polytechnic Institute, Lviv, Ukraine
Wachenheim, Cheryl, Professor, Agribusiness and 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, Physics
 Ph.D., 1997, Oxford University
Walden, Justin, Associate Professor, Communication

Ph.D., 2013, Penn State University

Wang, Danling, Associate Professor, Electrical & Computer Engineering

Ph.D., 2003, Peking University

Wang, Wan, Assistant Professor, Communication

Ph.D., 2021, University of Texas at Austin

Wang, Wen, Assistant Professor, Human Development and Family Science

Ph.D., 2018, Michigan State University

Wang, Xinnan, Associate Professor, Mechanical Engineering

Ph.D., 2008, University of South Carolina

Wang, Yechun, Associate Professor, Mechanical Engineering

Ph.D., 2007, University of Maryland at College Park

Weber, Michael, Professor, Division of Performing Arts

D.M.A., 1990, University of Arizona

Weber Knopp, Christina, Professor, Sociology, Anthropology

Ph.D., 2005, State University of New York, Buffalo

Webster, Dean, Professor, Coatings & Polymeric Materials

Ph.D., 1984, Virginia Polytechnic Institute and State University

Webster, Richard, Assistant Professor, Plant Pathology

Ph.D., 2022, University of Wisconsin-Madison

Werner-Wilson, Ronald, Professor, Human Development and Family Science

Ph.D., 1993, University of Georgia

Werremeyer, Amy, Professor, Pharmacy Practice

Pharm.D., 2005, North Dakota State University

West, Todd, Professor, Plant Sciences

Ph.D., 2004, Southern Illinois University

Westerman, David, Associate Professor, Communication

Ph.D., 2007, Michigan State University

Wickersham, Nicholas, Assistant Professor, School of Design, Architecture + Art

M.Arch., 2022, University of Wisconsin - Madison

Wilkinson, John, Associate Professor, Chemistry and Biochemistry

Ph.D., 2001, Vanderbilt University

Wilson, William, Distinguished Professor, Agribusiness and Applied Economics

Ph.D., 1980, University of Manitoba

Wimberly, Ashleah, Assistant Professor, English

Ph.D., 2024, Florida State University

Wing, Heath, Associate Professor, School of Humanities

Ph.D., 2015, Texas Tech University

Wischer, Stephen, Associate Professor, School of Design, Architecture + Art

M. Arch., 2004, University of Calgary

Wottrich, Tyler, Associate Professor, Division of Performing Arts

D.M.A., Stony Brook University

Wright, Newell, Professor, Management and Marketing

Ph.D., Virginia Polytechnic Institute and State University

Wu, Di, Associate Professor, Electrical & Computer Engineering

Ph.D., 2011, Polytechnic University of Turin

Wu, Xiangfa, Professor, Mechanical Engineering

Ph.D., 2003, University of Nebraska

Xu, Jiale, Assistant Professor, Civil, Construction & Environmental Engineering

Ph.D., 2020, University at Buffalo

Xu, Minwei, Assistant Professor, Plant Sciences

Ph.D., 2019, North Dakota State University

Yan, Changhui, Professor, Computer Science

Ph.D., 2005, Iowa State University

Yan, Guiping, Associate Professor, Plant Pathology

Ph.D., Washington State University

Yang, Mijia, Professor, Civil, Construction & Environmental Engineering

Ph.D., 2006, University of Akron

Yang, Zhongyu, Associate Professor, Chemistry and Biochemistry

Ph.D., 2010, University of Pittsburgh

Yu, Yao, Associate Professor, Civil, Construction & Environmental Engineering

Ph.D., 2014, North Carolina Agricultural and Technical State University

Yuan, Mingao, Associate Professor, Statistics

Ph.D., 2018, Purdue University

Zarak, Jenny, Associate Professor, School of Education

Ph.D., 2011, University of Illinois at Urbana-Champaign

Zeng, Cheng, Associate Professor, Communication

Ph.D., 2018, University of Jyväskylä

Zhang, Limin, Associate Professor, Accounting & Information Systems

Ph.D., 2006, University of Arizona

Zhang, Qi, Associate Professor, Plant Sciences

Ph.D., 2007, Kansas State University

Zhang, Qifeng, Associate Professor, Electrical & Computer Engineering

Ph.D., 2001, Peking University

Zhang, Wei, Professor, Transportation, Logistics, & Finance

Ph.D., 2001, Syracuse University

Zhang, Yan, Associate Professor, Mechanical Engineering

Ph.D., 2013, Iowa State University

Zhao, Pinjing, Professor, Chemistry and Biochemistry

Ph.D., 2003, Cornell University

Zhong, Shaobin, Professor, Plant Pathology

Ph.D., 2000, North Dakota State University

Zuk, Alan, Associate Professor, 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.

To nominate someone for Affiliate Graduate Faculty status 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 attach the nominee's current curriculum vitae. The nomination form requires the nominator to indicate the level of Affiliate Faculty Membership the program proposes the applicant should be given. The nomination must be approved by the department chair, head or director of the academic unit. If approved, the nomination is review by the Graduate Council This request is forwarded to the dean of the academic college in which the program resides for approval. If approved, the nomination is 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.

This same process is used for reappointments.

Professors of Practice and Research Professors

Faculty status by their department chairs. The criteria for each level are the same, but the term of their affiliate status is open-ended. This means they do not need to reapply unless they want to change their level (for example, from Level 3 to Level 2).

Renewals: When a Professor of Practice's appointment is renewed, their Affiliate Graduate Faculty status is automatically renewed, as long as there is no change in their research percentage.

Change in Research Percentage: If a Professor of Practice's research percentage is reduced, they must reapply for Affiliate Graduate Faculty status.

Termination: A department can terminate an individual's Affiliate Graduate Faculty status without terminating their position.

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

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. Their 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

Barnacle, MyKell, School of Nursing

2029 Fall

Benna, Justin, School of Education

2029 Fall

Benning, Kerri, Nursing

2029 Spring

Biermacher, Jon, Agribusiness and Applied Economics

2029 Spring

Borowicz, Pawel, Animal Sciences

2029 Summer

Boyer, Jeff, School of Education

2029 Fall

Brunsvold (Burkett Vetter), Abigail, Nursing

2029 Spring

Bullock, David, Agribusiness and Applied Economics

2030 Spring

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

Drescher, Matthew, HNES

2029 Fall

Dybing, Alan, Transportation and Logistics

2026 Spring

Ewert, Dan, Electrical and Computer Engineering

2027 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

2029 Fall

Gibbs, Rachel, Animal Sciences

2029 Fall

Gross, Dean, 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

Kalina, Emily, Nursing

2027 Fall

Koparan, Cengiz, Agricultural and Biosystems Engineering

2026 Fall

Leitch, Jay, Agribusiness and Applied Economics

2026 Spring

Littlefield, Robert, Communication

2027 Spring

McQueston, Jessica, School of Education

2027 Fall

Nelson, Carrie, Nursing

2029 Spring

Ostlie, Michael, Plant Sciences

2028 Fall

Peltier, Allison, School of Nursing

2029 Fall

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

Sinha, Sangita, Biochemistry

2030 Spring

Staricka, James, Natural Resource Sciences

2029 Fall

Subramanian, Hariharaputhiran, Chemistry and Biochemistry

2031 Spring

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

White, Joel, Health, Nutrition and Exercise Science

2030 Spring

Williamson, Julia, Pharmacy Practice

2027 Spring

Wooldridge, Joshua, HNES

2029 Fall

Wyatt, Nathan, Plant Pathology

2030 Spring

Yodo, Nita, Industrial & Manufacturing Engineering

2028 Fall

Yonk, Ryan, Agribusiness and Applied Economics

2026 Fall

Level 2

Ajayi-Banji, Ademola, Agricultural and Biosystems Engineering

2026 Fall

Augustin, Christopher, School of Natural Resource Sciences

2026 Fall

Beaver, James, Plant Sciences

2025 Fall

Beik, Omid, Electrical and Computer Engineering

2027 Spring

Beyer, Erin, Animal Sciences

2026 Fall

Bolton, Melvin, Plant Pathology

2026 Spring

Bortolon, Leandro, Animal Sciences

2027 Spring

Cabello Leiva, Sergio, School of Natural Resource Sciences

2027 Spring

Carlson, Zachary, Animal Sciences

2026 Spring

Carr, Patrick, Plant Sciences

2025 Fall

Chandra Sarkar, Niloy, Agricultural and Biosystems Engineering

2027 spring

Chao, Wun, Plant Sciences

2025 Fall

Chu, Chenggen, Plant Sciences

2027 Spring

Crouse, Matthew, Animal Sciences

2027 Spring

Cushman, Robert, Animal Sciences

2027 Spring

da Silva Diniz, Wellison Jarles, Animal Science

2026 Spring

Daigh, Aaron, Soil Science

2025 Fall

Danielson, Jessica, Counselor Education

2026 Fall

Day, Stephanie, Biological Science

2026 Fall

Fauske, Gerald, School of Natural Resource Sciences

2026 Fall

Fiedler, Jason, Plant Sciences

2025 Fall

Forster, Shana, Plant Sciences

2026 Fall

Friesen, Timothy, Plant Pathology

2026 Fall

Gasch, Caley, School of Natural Resource Sciences

2026 Spring

Grier, James, Biological Sciences

2026 Fall

Hassel, Holly, English

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

Jenks, Brian, Plant Sciences

2027 Spring

Johnson, Blaine, Plant Sciences

2025 Fall

Kalil, Audrey, Plant Sciences

2026 Fall

Kandel, Shyam, Plant Pathology

2025 Fall
Karn, Rupak, Agricultural and Biosystems Engineering
2027 Spring
Katuwal, Krishna, Plant Sciences
2027 Spring
Kelley, Suzanne, History, Philosophy and Religion
2025 Fall
Kim, Dongin, Agribusiness and Applied Economics
2027 Spring
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
Lupton, Sara, School of Natural Resource Sciences
2026 Fall
Maddock, Robert, Animal Science
2026 Spring
Mallik, Sanku, Pharmaceutical Sciences
2026 Fall
McCall, Mary, English
2026 Fall
McFadden, Lisa, Biomedical Engineering
2026 Spring
O'Brien, Peter, Natural Resource Sciences
2026 Fall
Otto, Clint, School of Natural Resource Sciences
2026 Fall
Palit, Rakhi, School of Natural Resource Sciences
2027 Spring
Peters Haugrud, Amanda, Plant Sciences
2027 Spring
Pourhashem, Ghasideh, Coatings and Polymeric Materials
2026 Spring
Pradhan, Gautam Prasad, Plant Sciences
2025 Fall
Quail, Lacey, Animal Sciences
2026 Fall
Reed, Wendy, Biological Science
2026 Fall
Riley, David, Animal Sciences
2026 Fall
Rinehart, Joseph, Biological Sciences
2026 Fall
Schachterle, Jeffrey, Plant Pathology
2025 Fall
SenGupta, Indranil, Mathematics
2027 Spring
Simsek, Senay, Plant Sciences
2025 Fall
Smith, Matthew, Biological Sciences
2027 Spring
Strommen, Jane, Human Development & Family Science
2026 Spring
Tobin, Colin, Animal Sciences
2026 Fall
Torson, Alex, Biological Science
2026 Fall
Underwood, William, Plant Pathology

2027 Spring

Vangsness Frisch, Jane, School of Education

2027 Spring

Vonnahme, Kimberly, Animal Sciences

2026 Spring

Walia, Gursimran, Computer Science

2026 Fall

Ward, Alison, Animal Sciences

2026 Spring

Wehbi, Nizar, Public Health

2025 Fall

Wick, Abbey, School of Natural Resource Sciences

2026 Fall

Wiersma, Jochum, Plant Sciences

2025 Fall

Wisenden, Brian, Biological Sciences

2027 spring

Xia, Wenjie, Coatings and Polymeric Materials

2026 Fall

Yadav, Om Prakash, Industrial & Manufacturing Engineering

2025 Fall

Yang, Shengming, Plant Sciences

2025 Fall

Yu, Haipeng, Animal Sciences

2026 Fall

Zelevnik, Joe, School of Natural Resource Sciences

2027 Spring

Zitnick Anderson, Kimberly, Plant Pathology

2026 Fall

Zurita, Carlos, Agribusiness and Applied Economics

2027 Spring

Level 3

Ahlering, Marissa, Biological Sciences

2027 Spring

Anast, Justin, Microbiology

2026 Fall

Bonnett, David, Plant Sciences

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, School of Humanities

2026 Spring

Doetskott, Curt, Statistics

2026 Fall

Dogramaci, Munevver, Plant Sciences

2027 Spring

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

Gesch, Russell, Plant Sciences
2025 Fall

Gomes, Victor, Plant Sciences
2027 Spring

Gruener, Chandler, School of Natural Resource Sciences
2027 Spring

Grusak, Michael, Plant Sciences
2025 Fall

Gupta, Rajee, Plant Sciences
2025 Fall

Haagenson, Darrin, Plant Sciences
2025 Fall

Horvath, David, Plant Sciences
2025 Fall

Hulke, Brent, Plant Sciences
2025 Fall

Kaya, Ozkan, Plant Sciences
2027 Spring

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

Ohm, Jae-Bom, Plant Sciences
2025 Fall

Piercy, Cameron, Communication
2027 Spring

Qi, Lili, Plant Sciences
2025 Fall

Rogers, James, Plant Sciences
2025 Fall

Ryan, Anneli, School of Humanities
2026 Spring

Snider, Alexandria, Animal Sciences
2025 Fall

Travineck, Andrea, Natural Resources Management
2025 Fall

Trela, Brent, Plant Sciences
2025 Fall

Tyler, Katie, Agricultural and Family Education
2027 Spring

Tyre, Brenda, Accounting and Information Systems
2026 Fall

Uselman, Tamara, School of Education
2027 Spring

Webb, Brett, Microbiology
2026 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.

Curriculum

Graduate (p. 117)

Undergraduate (p. 296)

Graduate Curricula

A (p. 117) B (p. 118) C (p. 118) D (p. 120) E (p. 120) F (p. 121) G (p. 121) H (p. 121) I (p. 122) J K L (p. 122) M (p. 122) N (p. 123) O (p. 123) P (p. 123) Q (p. 124) R (p. 124) S (p. 124) T (p. 125) U V W (p. 125) X Y (p. 125) Z

* Online

A

Accountancy

- Masters (p. 125)

Adult Learning

- Certificate (p. 127)

Adult-Gerontology Acute Care Nurse Practitioner*

- Certificate (p. 127)

Advanced Coaching Education*

- Certificate (p. 128)

Advanced Physical Education Teaching*

- Certificate (p. 128)

Agribusiness and Applied Economics

- Masters (p. 129)

Agricultural and Biosystems Engineering

- Doctorate (p. 130)
- Masters (p. 131)

Agricultural Education*

- Masters (p. 132)

Agriculture*

- Masters (p. 134)

Animal Sciences

- Doctorate (p. 135)
- Masters (p. 136)

Anthropology

- Masters (p. 137)

Applied Epidemiology*

- Certificate (p. 138)

Applied Nutrition and Grazing Management*

- Certificate (p. 138)

Applied Statistics

- Masters (p. 139)

Architecture

- Masters (p. 140)

Athletic Training

- Masters (p. 141)

B

Big Data Applied Statistical Analysis*

- Certificate (p. 142)

Biochemistry

- Doctorate (p. 143)
- Masters (p. 144)

Biological Sciences

- Doctorate (p. 145)

Biology

- Masters (p. 146)

Biomedical Engineering*

- Doctorate (p. 146)
- Masters (p. 147)

Building Software Projects*

- Certificate (p. 148)

Business Administration*

- Masters (p. 148)

Business Administration - Agribusiness

- Masters (p. 150)

Business Analytics

- Masters (p. 152)
- Certificate (p. 153)

C

Cellular and Molecular Biology

- Doctorate (p. 154)

Cereal Science

- Doctorate (p. 155)
- Masters (p. 156)

Chemistry

- Doctorate (p. 157)
- Masters (p. 159)

Civil Engineering

- Doctorate (p. 160)
- Masters (p. 161)

Coatings and Polymeric Materials

- Doctorate (p. 162)
- Masters (p. 163)

College Teaching

- Certificate (p. 163)

Communication

- Doctorate (p. 164)
- Masters (p. 165)

Community Development*

- Masters (p. 166)
- Certificate (p. 168)

Community Planning and Resilience*

- Masters (p. 169)

Computer Science

- Doctorate (p. 169)
- Masters (p. 172)

Computer Science Education*

- Certificate (p. 173)

Construction Management*

- Masters (p. 174)
- Certificate (p. 175)

(p. 175) Counseling

- Masters (p. 176)

Counselor Education and Supervision

- Doctorate (p. 179)

Criminal Justice

- Doctorate (p. 180)
- Masters (p. 181)

Critical Skills in Agricultural Sciences*

- Certificate (p. 182)

Crop Production*

- Certificate (p. 183)

Crop Protection*

- Certificate (p. 184)

Cybersecurity *

- Certificate (p. 184)

D

Data Science*

- Masters (p. 185)

Developmental Science

- Doctorate (p. 186)

Digital Marketing and Innovation*

- Certificate (p. 188)

Discipline Based Education Research (DBER)

- Doctorate (p. 188)

E

Education

- Doctorate (p. 189)
- Masters (p. 190)*

Educational Leadership*

- Masters (p. 193)

Electrical and Computer Engineering

- Doctorate (p. 194)
- Masters (p. 195)

Energy Engineering- Buildings

- Certificate (p. 197)

Energy Engineering- Generation

- Certificate (p. 197)

Energy Engineering-Vehicles

- Certificate (p. 196)

English

- Masters (p. 198)

Enterprise Resource Planning (ERP)*

- Certificate (p. 198)

Environmental and Conservation Sciences

- Doctorate (p. 199)
- Masters (p. 204)

Environmental Engineering

- Masters (p. 204)

Exercise and Nutrition Sciences

- Doctorate (p. 205)
- Masters (p. 207)*

Extension Education

- Masters (p. 209)*
- Certificate (p. 210)

F**Family and Consumer Science Education***

- Masters (p. 210)

Family Financial Planning*

- Certificate (p. 212)

Family Nurse Practitioner (DNP)

- Doctorate (p. 214)

Food Safety*

- Certificate (p. 215)

Foundations of Mental Health Care*

- Certificate (p. 216)

Fundamentals of Software Engineering*

- Certificate (p. 216)

G**Genomics, Phenomics, and Bioinformatics**

- Doctorate (p. 216)
- Masters (p. 220)

Gerontology

- Doctorate (p. 224)
- Certificate (p. 225)*

Geographic Information Systems*

- Certificate (p. 223)

H**History**

- Doctorate (p. 225)
- Masters (p. 226)

Horticulture and Urban Agriculture

- Masters (p. 227)

Horticulture Management*

- Certificate (p. 228)

Human Development and Family Science*

- Masters (p. 228)
 - Developmental Science
 - Family Financial Planning
 - Gerontology
 - Youth Development

I

Industrial and Manufacturing Engineering

- Doctorate (p. 230)
- Masters (p. 231)*

Intercollegiate Athletic Administration*

- Certificate (p. 233)

International Agribusiness

- Masters (p. 234)

L

Landscape Architecture

- Masters (p. 235)

Leadership and Managerial Skills*

- Certificate (p. 236)

Leadership in Physical Education and Sport Coaching*

- Masters (p. 236)

M

Malting and Brewing*

- Certificate (p. 237)

Management of Software Engineering Projects*

- Certificate (p. 238)

Materials and Nanotechnology

- Doctorate (p. 238)
- Masters (p. 240)

Mathematics

- Doctorate (p. 241)
- Masters (p. 242)

Mechanical Engineering

- Doctorate (p. 243)
- Masters (p. 244)*

Microbiology

- Doctorate (p. 245)
- Masters (p. 247)

Milling, Baking & Pasta Making*

- Certificate (p. 249)

Music

- Doctorate (p. 250)
- Masters (p. 253)*

N

Natural Resources Management*

- Masters (p. 257)

Natural Resource Sciences

- Doctorate (p. 257)
- Masters (p. 258)

New Institutional Social Science

- Certificate (p. 259)

O

One Health*

- Certificate (p. 260)

Organizational Change Management*

- Certificate (p. 260)

P

Pharmaceutical Sciences

- Doctorate (p. 261)

Physics

- Doctorate (p. 262)
- Masters (p. 263)

Plant Pathology

- Doctorate (p. 264)
- Masters (p. 264)
- Certificate (p. 265)*

Plant Sciences

- Doctorate (p. 265)
- Masters (p. 267)

Professional Writing

- Certificate (p. 268)

Psychology

- Doctorate (p. 269)

Public Health*

- Masters (p. 270)
- Certificate (p. 271)

Public Health in Epidemiology*

- Masters (p. 272)

Public Policy

- Masters (p. 274)

Public Policy Evaluation*

- Certificate (p. 275)

Publishing

- Certificate (p. 276)

Q

Quantitative Genetics*

- Certificate (p. 276)

R

Rangeland Ecology and Management*

- Certificate (p. 277)

Rhetoric, Theory and Culture

- Doctorate (p. 278)

S

Sociology

- Masters (p. 279)

Software Engineering*

- Masters (p. 280)
- Certificate (p. 281)

Software and Security Engineering

- Doctorate (p. 282)
- Masters (p. 284)

Soil Conservation and Management*

- Certificate (p. 286)

Sport Management*

- Masters (p. 286)

Statistics

- Doctorate (p. 287)
- Certificate (p. 288)

Student Affairs Administration*

- Certificate (p. 289)

Supervision and Management in Physical Education and Coaching*

- Certificate (p. 289)

Supply Chain Management*

- Certificate (p. 290)

Sustainable Agriculture and Ecosystem Services*

- Certificate (p. 291)

T

Transportation and Logistics*

- Masters (p. 291)

Transportation and Supply Chain

- Doctorate (p. 292)

W

Women and Gender Studies

- Certificate (p. 293)

Y

Youth Development*

- Certificate (p. 294)

Youth Program Management and Evaluation*

- Certificate (p. 295)

Accountancy Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/accountancy (<http://ndsu.edu/programs/graduate/accountancy/>)
- **Department Web Site:**
ndsu.edu/business/programs/graduate/macc/ (<http://ndsu.edu/business/programs/graduate/macc/>)
- **Application Deadline:**
Rolling admission schedule
- **Credential Offered:**
M.Acc.
- **Test Requirement:**
GMAT
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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 618	Tax Accounting I ¹	
ACCT 619	Tax Accounting II ¹	
ACCT 620	Accounting Information Systems ¹	
ACCT 621	Auditing I 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	Business Data Mining and Predictive Analytics ³	
MIS 720	Data Visualization ³	
MIS 790	Graduate Seminar ³	
MIS 710	Database Management ³	
MIS 740	Predictive Analytics 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****Admission and Application Requirements**

- Undergraduate degree from an Association to Advance Collegiate Schools of Business (AACSB^{*}) accredited institution.
- Minimum overall cumulative GPA of 3.0 on a 4.0 scale.
- Minimum cumulative GPA for accounting upper-division courses of 3.0 on a 4.0 scale.
- A GPA of at least 2.9 on a 4.0 scale is required for the following courses and at most one C:
 - ACCT 311 (Intermediate Accounting I)
 - ACCT 312 (Intermediate Accounting II)
 - ACCT 320 (Cost Accounting)
 - ACCT 418 (Tax I)
 - ACCT 421 (Audit I)
- 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.
- A statement of purpose describing reasons for pursuing a Master of Accountancy (MAcc) degree.
- Two letters of recommendation. ^{**}
- 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.

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

All international applicants for this program are required to submit a course-by-course transcript evaluation from World Education Services (WES). See www.wes.org (<http://www.wes.org/>).

Adult Learning Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/adult-learning (<http://ndsu.edu/programs/graduate/adult-learning/>)
- **Department Web Site:**
ndsu.edu/education/ (<http://ndsu.edu/education/>)
- **Application Deadline:**
Fall semester - July 1, Spring semester - December 31
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission & Application Requirements

Admission and application requirements are found on the Admission Information (p. 73) page.

Adult-Gerontology Acute Care Nurse Practitioner Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/adult-gerontology-acute-care-nurse-practitioner (<http://ndsu.edu/programs/graduate/adult-gerontology-acute-care-nurse-practitioner/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

Admission and application requirements are found on the Admission Information (p. 73) page.

Advanced Coaching Education

Department Information

- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
HPER 704	Psychology of Sport and Physical Activity	3
HPER 708	Positive Youth Development in Physical Activity and Sport	3
Electives		
Select three credits from the following:		3
HPER 705	Content Development and Instructional Practices in Physical Education and Coaching	
HPER 707	Social Issues in Sport, Physical Activity and Coaching	
HPER 714	Legal Liability in Health, Physical Education, & Recreation	
HPER 731	Governance in Sport Coaching	
Total Credits		9

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Advanced Physical Education Teaching Certificate

Department Information

- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Course		
HPER 711	Physical Education Curriculum	3
Electives		
Choose six credits from the following:		6
HPER 715	Teaching Concepts-Based Fitness	
HPER 737	School-wide Physical Activity Promotion	
HPER 738	Adapted Physical Education	
HPER 739	SEL via the Adventure Education Instructional Model	
Total Credits		9

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Agribusiness and Applied Economics Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/agribusiness-and-applied-economics (<http://ndsu.edu/programs/graduate/agribusiness-and-applied-economics/>)
- **Department Web Site:**
ndsu.edu/agriculture/agribusiness-applied-economics/graduate-studies (<http://ndsu.edu/agriculture/agribusiness-applied-economics/graduate-studies/>)
- **Application Deadline:**
Fall Semester- March 1, Spring Semester- October 1
- **Test Requirement:**
GRE or GMAT
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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
Plan A: Thesis Option		
Required Courses		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)	6-10
Total Credits		30
Code	Title	Credits
Plan B: Master's Paper Option		
Required Courses		

AGEC 701	Research Methods	1
AGEC 739	Analytical Methods for Applied Economics	3
AGEC 741	Advanced Microeconomics	3
ECON 610	Econometrics	3
ECON 710	Advanced Econometrics	3
Courses numbered 601-689, 691; 700-789, 791; 800-889 and 891		13-15
AGEC 797	Master's Paper	2-4
Total Credits		30

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to 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.

Agricultural and Biosystems Engineering Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/agricultural-and-biosystems-engineering (<http://ndsu.edu/programs/graduate/agricultural-and-biosystems-engineering/>)
- **Department Web Site:**
ndsu.edu/aben/ (<http://ndsu.edu/aben/>)
- **Application Deadline:**
Fall semester international applications - May 1; Spring semester international applications- October 1; Domestic applications must be received at least one month prior to the start of the semester
- **Credential Offered:**
Ph.D.
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

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.

Additional Requirements

- 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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have completed the following coursework:

- Mathematics through Differential Equations (NDSU: MATH 266 (<https://catalog.ndsu.edu/search/?P=MATH%20266>) Introduction to Differential Equations)
- Statistics (NDSU: ME 221 (<https://catalog.ndsu.edu/search/?P=ME%20221>) Engineering Mechanics I) and Dynamics (NDSU: ME 222 (<https://catalog.ndsu.edu/search/?P=ME%20222>) Engineering Mechanics II); these two may be substituted by a calculus-based Physics I class
- Thermodynamics (NDSU: ME 350 (<https://catalog.ndsu.edu/search/?P=ME%20350>) Thermodynamics and Heat Transfer); may be substituted with ABEN 644 (<https://catalog.ndsu.edu/search/?P=ABEN%20644>) Transport Processes, which may also count toward graduate degree
- Fluid Mechanics (NDSU: CE 309 (<https://catalog.ndsu.edu/search/?P=CE%20309>) Fluid Mechanics or ME 352 (<https://catalog.ndsu.edu/search/?P=ME%20352>) Fluid Dynamics)
- Physics II/Electricity and Magnetism (NDSU: PHYS 252 (<https://catalog.ndsu.edu/search/?P=PHYS%20252>) University Physics II)
- 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.
- The major adviser may appeal to the ABEN graduate committee (not the student's supervisory committee) for substitutions or waivers of these requirements.
- Students are responsible for covering the costs of undergraduate courses.

Agricultural and Biosystems Engineering Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/agricultural-and-biosystems-engineering/ (<http://ndsu.edu/programs/graduate/agricultural-and-biosystems-engineering/>)
- **Department Web Site:**
ndsu.edu/aben/ (<http://ndsu.edu/aben/>)
- **Application Deadline:**
Fall international applications - May 1; Spring international applications- October 1; Domestic applications must be received at least one month prior to the start of the semester
- **Credential Offered:**
M.S.
- **Test Requirement:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have completed the following coursework:
 - Mathematics through Differential Equations (NDSU: MATH 266 (<https://catalog.ndsu.edu/search/?P=MATH%20266>) Introduction to Differential Equations)
 - Statistics (NDSU: ME 221 (<https://catalog.ndsu.edu/search/?P=ME%20221>) Engineering Mechanics I) and Dynamics (NDSU: ME 222 (<https://catalog.ndsu.edu/search/?P=ME%20222>) Engineering Mechanics II); these two may be substituted by a calculus-based Physics I class
 - Thermodynamics (NDSU: ME 350 (<https://catalog.ndsu.edu/search/?P=ME%20350>) Thermodynamics and Heat Transfer); may be substituted with ABEN 644 (<https://catalog.ndsu.edu/search/?P=ABEN%20644>) Transport Processes, which may also count toward graduate degree
 - Fluid Mechanics (NDSU: CE 309 (<https://catalog.ndsu.edu/search/?P=CE%20309>) Fluid Mechanics or ME 352 (<https://catalog.ndsu.edu/search/?P=ME%20352>) Fluid Dynamics)
 - Physics II/Electricity and Magnetism (NDSU: PHYS 252 (<https://catalog.ndsu.edu/search/?P=PHYS%20252>) University Physics II)
- 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.
- The major adviser may appeal to the ABEN graduate committee (not the student's supervisory committee) for substitutions or waivers of these requirements.
- Students are responsible for covering the costs of undergraduate courses.

Agricultural Education Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/agricultural-education (<http://ndsu.edu/programs/graduate/agricultural-education/>)
- **Department Web Site:**
ndsu.edu/agriculture/agricultural-family-education/agricultural-education (<http://ndsu.edu/agriculture/agricultural-family-education/agricultural-education/>)
- **Application Deadline:**
Applications will be accepted up to 3 weeks prior to the start of a new semester
- **Credential Offered:**
M.Ed., M.S.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6, Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Master of Education Curriculum

Code	Title	Credits
M.Ed. - Licensed Teachers		
Core Courses		12
EDUC 750	Reflective Practice and Research in Education	3
EDUC 751	Students and Their Learning	
EDUC 732 or EDUC 752	Curriculum, Instruction and Learning Theory 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	
Electives (as approved by adviser)	
H&CE 794	3
Total Credits	30

Code	Title	Credits
M.Ed. - 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	Advising FFA and SAE	
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

Code	Title	Credits
M.Ed. - 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	Advising FFA and SAE	
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 for teacher licensure, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the licensure program, 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.

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.

Master of Science Curriculum

Code	Title	Credits
Core Courses		15
EDUC 703 or EDUC 750	Research, Measurement and Program Evaluation Reflective Practice and Research in Education	
EDUC 751	Students and Their Learning	
EDUC 732 or EDUC 752	Curriculum, Instruction and Learning Theory Curriculum Design and Delivery	
EDUC 753	Managing/ and Monitoring Learning	
EDUC 702	Statistics In Educational Research	
Major/Concentration		9
Choose from the following:		
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	
Research		
H&CE 798	Master's Thesis	6
Total Credits		30

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Agriculture Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/agriculture (<http://ndsu.edu/programs/graduate/agriculture/>)
- **Credential Offered:**
M.Ag.

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

The Master of Agriculture program is designed as a stackable certificate program. There are 16 certificates that students can select from towards the completion of the degree.

Code	Title	Credits
Certificate credits*		27
Capstone Experience (AGRI 793, AGRI 794, AGRI 795)		3
Total Credits		30

- * Students transitioning from a doctoral program, a Plan A (thesis) or to a Plan B (paper) master's program may apply up to three (3) previously earned research credits towards this degree.

Code	Title	Credits
Example Plan		
Crop Production certificate		8

Crop Protection certificate	8
Malting and Brewing certificate	11
Capstone Experience (AGRI 793/794/795)	3
Total Credits	30

Certificate Options

Animal Genetics
 Applied Nutrition and Grazing Management
 Critical Skills in Agricultural Sciences
 Crop Production
 Crop Protection
 Extension Education
 Food Safety
 Horticulture Management
 Malting and Brewing
 Management and Leadership
 Milling, Baking, and Pasta Making
 One Health
 Plant Pathology
 Rangeland Ecology and Management
 Soil Conservation and Management
 Sustainable Agriculture and Ecosystem Services

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Animal Sciences Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/animal-sciences/ (<http://ndsu.edu/programs/graduate/animal-sciences/>)
- **Department Web Site:**
ndsu.edu/agriculture/academics/academic-units/animal-sciences/ (<http://ndsu.edu/agriculture/academics/academic-units/animal-sciences/>)
- **Application Deadline:**
 Applications are accepted for fall, spring and summer semester admits.
- **Credential Offered:**
 Ph.D.
- **English Proficiency Requirements:**
 TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to contact potential advisors in the department before formal application to the Graduate School. The applicant 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.

Animal Sciences Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/animal-sciences/ (<http://ndsu.edu/programs/graduate/animal-sciences/>)
- **Department Web Site:**
ndsu.edu/agriculture/academics/academic-units/animal-sciences/ (<http://ndsu.edu/agriculture/academics/academic-units/animal-sciences/>)
- **Application Deadline:**
 Applications are accepted for fall, spring and summer semester admits.
- **Credential Offered:**
 M.S.
- **English Proficiency Requirements:**
 TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
Didactic coursework (601-689, 691; 700-789, 791; 800-889, 891)		16
Statistical Courses*		6
STAT 661	Applied Regression Models	
PLSC 724	Field Design I	
ANSC 790	Graduate Seminar	2
ANSC 792	Graduate Teaching Experience **	2
ANSC 798	Master's Thesis (6-10 credits)	6
Total Credits		32

* Other NDSU statistical courses or equivalents (transfer credit)

** Required for students receiving assistantships.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to contact potential advisors in the department before formal application to the Graduate School. The applicant 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.

Anthropology Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/anthropology (<http://ndsu.edu/programs/graduate/anthropology/>)
- **Department Web Site:**
ndsu.edu/socanth (<http://ndsu.edu/socanth/>)
- **Application Deadline:**
Fall Semester- February 1
- **Credential Offered:**
M.A., M.S.
- **English Proficiency Requirements:**
TOEFL ibt 100; IELTS 7; Duolingo 125

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Applied Epidemiology Certificate

Department Information

- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
PH 706	Essentials of Epidemiology	3
PH 712	Public Health Research Methods	3
PH 753	Public Health Surveillance	2
PH 754	Health Survey Research	2
Total Credits		10

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Applied Nutrition and Grazing Management Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/applied-nutrition-grazing-management (<http://ndsu.edu/programs/graduate/applied-nutrition-grazing-management/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
ANSC 625	Applied Animal Grazing Nutrition	3
RNG 658	Grazing Ecology and Rangeland Management	3
PLSC 620	Integrated Forage and Cover Crops Production Management and Ecosystem Services	3
Total Credits		9

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (<https://catalog.ndsu.edu/graduate/admission-information/#admissionrequirementstext>) page.

Applied Statistics Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/statistics (<http://ndsu.edu/programs/graduate/statistics/>)
- **Department Web Site:**
ndsu.edu/statistics/ (<http://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:**
M.S.
- **Test Requirement:**
GRE
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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 or STAT 874	Multivariate Methods 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	Applied Spatial Statistics	
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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to:
 - Have had at least one year of calculus,
 - Have had at least one course in statistics, and
 - Have had at least one programming language

Architecture Master's

Department Information

- **Program Information:**
ndsus.edu/programs/graduate/architecture (<http://ndsus.edu/programs/graduate/architecture/>)
- **Department Web Site:**
ndsus.edu/sodaa/ (<http://ndsus.edu/sodaa/>)
- **Application Deadline:**
 Fall semester - February 1
- **Credential Offered:**
 M.Arch
- **English Proficiency Requirements:**
 TOEFL iBT 80; IELTS 6.5, Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
ARCH 763	Thesis Research	3
ARCH 781	Professional Practice	3
ARCH 771	Advanced Architectural Design	6
ARCH 772	Design Thesis	6
Select 12 credits from the following. Six credits may be taken in another graduate program with permission from the Architecture Dept.		12
ARCH 721	Non-Western Architectural Traditions	
ARCH 722	Urbanism	
ARCH 723	Historic Preservation	
ARCH 724	Architectural Technology	
ARCH 725	Architecture or the Recent Past	
ARCH 726	Current Architectural Theory	
ARCH 727	Vernacular Architectural Traditions	

ARCH 728

Sociocultural Issues

ARCH 789

Professional Topics in Architecture

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- 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.

Athletic Training Master's

Department Information

- **Program Information:**
nds.u.edu/programs/graduate/athletic-training (<http://nds.u.edu/programs/graduate/athletic-training/>)
- **Department Web Site:**
nds.u.edu/hnes/graduate_programs/athletic_training_professional/ (http://nds.u.edu/hnes/graduate_programs/athletic_training_professional/)
- **Application Deadline:**
Rolling admission schedule
- **Credential Offered:**
M.A.Trg.
- **English Proficiency Requirements:**
TOFL (ibt): 100; IELTS: 7; Duolingo: 125; Academic PTE: 68

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

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

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following are required:

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 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.Trng. 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
 - i. Submit copy of certificate under supplemental materials.

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.

Big Data Applied Statistical Analysis Certificate

Department Information

- **Program Information:**
ndsuh.edu/programs/graduate/big-data-applied-statistical-analysis (<http://ndsuh.edu/programs/graduate/big-data-applied-statistical-analysis/>)
- **Department Web Site:**
ndsuh.edu/statistics/ (<http://ndsuh.edu/statistics/>)
- **Credential Offered:**
 Certificate
- **English Proficiency Requirements:**
 TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have knowledge of college algebra.

Biochemistry Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/biochemistry (<http://ndsu.edu/programs/graduate/biochemistry/>)
- **Department Web Site:**
ndsu.edu/chemistry (<http://ndsu.edu/chemistry/>)
- **Application Deadline:**
Fall semester- April 15; Spring semester- October 31. 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.
- **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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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 or CHEM 790	Graduate Seminar (second year seminar) Graduate Seminar	
BIOC 790 or CHEM 790	Graduate Seminar (proposal seminar) Graduate Seminar	
BIOC 790 or CHEM 790	Graduate Seminar (public presentation) Graduate Seminar	
BIOC 790	Graduate Seminar (defense seminar)	

or CHEM 790	Graduate Seminar
MICR 720	Scientific Integrity
As part of total semester credits, the following departmental courses are required for students based on program:	
CHEM 725	Advanced Survey of Inorganic Chemistry
BIOC 673	Methods of Biochemical Research
BIOC 674	Methods of Recombinant DNA Technology
BIOC 701	Comprehensive Biochemistry I
BIOC 702	Comprehensive Biochemistry II
CHEM 732	Advanced Survey of Analytical Chemistry
CHEM 741	Physical Organic Chemistry I
CHEM 759	Advanced Survey of Physical Chemistry
BIOC 899	Doctoral Dissertation

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Biochemistry Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/biochemistry (<http://ndsu.edu/programs/graduate/biochemistry/>)
- **Department Web Site:**
ndsu.edu/chemistry (<http://ndsu.edu/chemistry/>)
- **Application Deadline:**
Fall semester- April 15; Spring semester- October 31. 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:**
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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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	
MICR 720	Scientific Integrity	1
CHEM 790	Graduate Seminar (defense seminar)	1
or BIOC 790	Graduate Seminar	
Didactic Credits (601-689, 691; 700-789, 791; 800-889 and 891)		16 *
CHEM 798	Master's Thesis	6-10
or BIOC 798	Master's Thesis	
Total Credits Required		30
As part of total semester credits, the following departmental courses are recommended for students based on discipline:		
Analytical		
CHEM 632	Analytical Chemistry II	3

CHEM 730	Separations	2
CHEM 732	Advanced Survey of Analytical Chemistry	4
CHEM 736	Mass Spectrometry	2
Biochemistry and Molecular Biology		
BIOC 673	Methods of Biochemical Research	4
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	4
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		
CHEM 665	Survey of Physical Chemistry	4
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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Biological Sciences Doctorate

Department Information

- Program Information:**
ndsu.edu/programs/graduate/biological-sciences (<http://ndsu.edu/programs/graduate/biological-sciences/>)
- Department Web Site:**
ndsu.edu/biology/ (<http://ndsu.edu/biology/>)
- Application Deadline:**
January 15- for full consideration for an assistantship.
- Credential Offered:**
Ph.D.
- English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to connect with one or more departmental faculty members before and during the application process. Applicants will not be considered without a department faculty member who has agreed to serve as the major advisor.

Biology Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/biological-sciences (<http://ndsu.edu/programs/graduate/biological-sciences/>)
- **Department Web Site:**
ndsu.edu/biology/ (<http://ndsu.edu/biology/>)
- **Application Deadline:**
January 15- for full consideration for an assistantship.
- **Credential Offered:**
M.S.
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Master of Science (M.S.)		30
Basic Research Principles		
BIOL 790		
MICR 720	Scientific Integrity	
BIOL 842	Quantitative Biology (or equivalent as approved by committee)	
Biological Content Courses to be approved by the advisory committee.		
BIOL 798		

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to connect with one or more departmental faculty members before and during the application process. Applicants will not be considered without a department faculty member who has agreed to serve as the major advisor.

Biomedical Engineering Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/biomedical-engineering (<http://ndsu.edu/programs/graduate/biomedical-engineering/>)
- **Department Web Site:**
ndsu.edu/coe/bme (<http://ndsu.edu/coe/bme/>)
- **Application Deadline:**
Fall semester- February 15; Spring semester- September 15
- **Credential Offered:**

Ph.D.

- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6, Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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)

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have a Bachelor of Science degree from an ABET accredited engineering program.
 - Students holding a B.S. degree in other disciplines may be admitted with an obligation to acquire the necessary background undergraduate engineering knowledge.

Biomedical Engineering Master's

Department Information

- **Program Information:**
nds.u.edu/programs/graduate/biomedical-engineering (<http://nds.u.edu/programs/graduate/biomedical-engineering/>)
- **Department Web Site:**
nds.u.edu/coe/bme/ (<http://nds.u.edu/coe/bme/>)
- **Application Deadline:**
Fall semester- February 15; Spring semester- September 15
- **Credential Offered:**
M.S.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6, Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have a Bachelor of Science degree from an ABET accredited engineering program.
- Students holding a B.S. degree in other disciplines may be admitted with an obligation to acquire the necessary background undergraduate engineering knowledge.

Building Software Projects Certificate

Department Information

- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
CSCI 712	Mobile Software Engineering	3
CSCI 717	Software Construction	3
CSCI 848	Empirical Methods in Software Engineering	3
Total Credits		9

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Business Administration Master's

Department Information

- **Program Information:**
ndsuh.edu/programs/graduate/business-administration (<http://ndsuh.edu/programs/graduate/business-administration/>)
- **Department Web Site:**

ndsu.edu/mba (<http://ndsu.edu/mba/>)

- **Application Deadline:**
Rolling admission schedule
- **Credential Offered:**
M.B.A.
- **Test Requirement:**
GMAT or GRE
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
EARLY CAREER MBA		
Core Courses		
MBA 701	Strategic Cost Management	2
MBA 702	Advanced Financial Management	2
MBA 703	Advanced Organizational Behavior	2
MBA 704	Supply Chain and Operations Management	2
MBA 705	Strategic Marketing Management	2
MBA 706	Managing Information Resources	2
MBA 707	Microeconomics for Managers	2
MBA 708	Advanced Strategic Management	2
Elective Courses		
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 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.		14
Total Credits		30

Code	Title	Credits
PROFESSIONAL MBA		
Core Courses		
MBA 701	Strategic Cost Management	2
MBA 702	Advanced Financial Management	2
MBA 703	Advanced Organizational Behavior	2
MBA 704	Supply Chain and Operations Management	2
MBA 705	Strategic Marketing Management	2
MBA 706	Managing Information Resources	2
MBA 708	Advanced Strategic Management	2
MBA 733	Management Decision Making	2
MBA 790	Graduate Seminar	2
MGMT 727	Organizational Change Management	3
MGMT 752	Organizational Restructuring	3
Elective Courses		
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 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.		6
Total Credits		30

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- Applicants 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.
- 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.

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.

Dual Degree 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).

Business Administration (Agribusiness) Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/mba-agribusiness (<http://ndsu.edu/programs/graduate/mba-agribusiness/>)
- **Department Web Site:**
ndsu.edu/business/agmba/ (<http://ndsu.edu/business/agmba/>)
- **Application Deadline:**
 Rolling admission schedule
- **Credential Offered:**
 M.B.A.
- **Test Requirement:**
 GMAT or GRE
- **English Proficiency Requirements:**
 TOEFL ibt 79; IELTS 6.5; Duolingo 105
- **Sample Program Guide:**
ndsu.edu/programs/graduate/business-administration (<http://ndsu.edu/programs/graduate/business-administration/>)

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

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 and 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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- Applicants 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.
- 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.

Business Analytics Master's

Department Information

- Program Information:**
ndsu.edu/programs/graduate/business-analytics (<http://ndsu.edu/programs/graduate/business-analytics/>)
- Department Web Site:**
ndsu.edu/business/programs/graduate/msba/ (<http://ndsu.edu/business/programs/graduate/msba/>)
- Application Deadline:**
 Rolling admission schedule
- Credential Offered:**
 M.S.
- Test Requirement:**
 GMAT or GRE
- English Proficiency Requirements:**
 TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

MSBA Program Curriculum (30 credits):

Code	Title	Credits
Core Courses		
Choose 21-22 credits from the following courses.		21-22
CSCI 765 or MIS 710	Introduction to Database Systems Database Management	
STAT 725	Applied Statistics	
MBA 722	Marketing Analytics and Customer Intelligence	
MBA 723	Digital Marketing	

MBA 751	Business Analytics Concepts
MBA 752	Business Analytics Strategy
MBA 753	Business Analytics Methods
MIS 720	Data Visualization
MIS 740	Predictive Analytics
MIS 790	Graduate Seminar

Elective Course Options

Choose eight or nine credits from the following options. 8-9

ACCT 611	Advanced Fraud Examination via Data Analytics
CSCI 724	Survey of Artificial Intelligence
CSCI 779	Advanced Machine Learning
IME 672	Simulation of Business and Industrial Systems
IME 774	Neural Networks
MIS 705	Programming for Business Analytics
SOC 670	Social Data Analysis
STAT 671	Introduction to the R Language
STAT 726	Applied Regression and Analysis of Variance
TL 735	Practical Data Analytics

Any 600- or 700-level courses offered by the College of Business, upon approval from the AIS graduate program director.

Total Credits 30

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- Applicants 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
- 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.

Business Analytics Certificate

Department Information

- Program Information:**
ndsu.edu/programs/graduate/business-analytics (<http://ndsu.edu/programs/graduate/business-analytics/>)
- Department Web Site:**
ndsu.edu/business/programs/graduate/graduate_certificates/ (http://ndsu.edu/business/programs/graduate/graduate_certificates/)
- Credential Offered:**
 Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Cellular and Molecular Biology Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/cellular-and-molecular-biology (<http://ndsu.edu/programs/graduate/cellular-and-molecular-biology/>)
- **Department Web Site:**
ndsu.edu/cellularmolecularbiology/ (<http://ndsu.edu/cellularmolecularbiology/>)
- **Application Deadline:**
Fall- February 15 (for applicants seeking a fellowship or assistantship); Spring- July 1
- **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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

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		3
ANSC 774		3
ANSC 813		3
ANSC 828	Advanced Reproductive Biology	3
ANSC 830	Growth Biology	3
ANSC 875		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		3
MICR 783		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 Genomics	4
PSCI 746	Neuropharmacology	3
PSCI 747	Cardiovascular Pharmacology	3
PSCI 762	Advanced Biopharmaceutics	2
PSCI 765	Cancer Cell Biology	2
ZOO 682		3

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have the following undergraduate coursework:
 - **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.
- Applicants should include the following in their statement of purpose:
 - Identify at least one Cellular and Molecular Biology faculty member with whom they wish to study.
 - Identify areas of interest that align with one or more CMB faculty's research. 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.

Cereal Science Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/cereal-science (<http://ndsu.edu/programs/graduate/cereal-science/>)
- **Department Web Site:**
ndsu.edu/agriculture/academics/academic-units/plant-sciences/graduate-programs (<http://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.
- **English Proficiency Requirements:**
 TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have adequate preparation in biochemistry/chemistry and the biological sciences, including microbiology.

Cereal Science Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/cereal-science (<http://ndsu.edu/programs/graduate/cereal-science/>)
- **Department Web Site:**
ndsu.edu/agriculture/academics/academic-units/plant-sciences/graduate-programs (<http://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:**
M.S.

- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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		
Choose 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		
Choose six credits from the following list:		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		31

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have adequate preparation in biochemistry/chemistry and the biological sciences, including microbiology.

Chemistry Doctorate

Department Information

- **Program Information:**
nds.edu/programs/graduate/chemistry (<http://nds.edu/programs/graduate/chemistry/>)
- **Department Web Site:**
nds.edu/chemistry/ (<http://nds.edu/chemistry/>)
- **Application Deadline:**

Fall semester- April 15; Spring semester- October 31 (If there are no spring openings, spring applications are automatically considered for the subsequent fall semester.)

• **Credential Offered:**

Ph.D.

• **Test Requirement:**

GRE required for applicants who have not earned a degree in the U.S.; GRE (general and subject) recommended for domestic applicants)

• **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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Didactic Courses		
CHEM 720	Introduction to Chemical Research	
MICR 720	Scientific Integrity	
CHEM 725	Advanced Survey of Inorganic Chemistry	
CHEM 732	Advanced Survey of Analytical Chemistry	
CHEM 741	Physical Organic Chemistry I	
CHEM 759	Advanced Survey of Physical Chemistry	
Required Non-Didactic Courses		
CHEM 790	Graduate Seminar (second year seminar)	
CHEM 790	Graduate Seminar (proposal seminar)	
CHEM 790	Graduate Seminar (defense seminar)	
CHEM 899	Doctoral Dissertation (Number of research credits determined by student and supervisory committee)	
Additional credits numbered 601 - 689, 691, 700 - 789 and 791 may also count toward the 90 credit total required by the College of Graduate and Interdisciplinary Studies if approved by the student's advisory and examination committee.		
Total Credits		90

- * A student matriculating with a master's degree, including one earned at an international institution, must earn not fewer than 60 graduate credits at NDSU. These credits must include the 19 listed above under Required Didactic Courses. Courses numbered 601-689 may be used for the Plan of Study as long as they have not been taken in an undergraduate or previous graduate program. Approved courses are Department of Chemistry & Biochemistry 625, 626, 627, 628, 630, and 676.

Additionally, the following departmental courses are available for students; Consult with committee for recommendations

Code	Title	Credits
Analytical		
CHEM 632	Analytical Chemistry II	3
CHEM 730	Separations	2
CHEM 736	Mass Spectrometry	2
Biochemistry and Molecular Biology		
BIOC 673	Methods of Biochemical Research	4
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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Chemistry Master's

Department Information

- Program Information:**
nds.edu/programs/graduate/chemistry (<http://nds.edu/programs/graduate/chemistry/>)
- Department Web Site:**
nds.edu/chemistry/ (<http://nds.edu/chemistry/>)
- Application Deadline:**
Fall semester- April 15; Spring semester- October 31 (If there are no spring openings, spring applications are automatically considered for the subsequent fall semester.)
- Test Requirement:**
GRE required for applicants who have not earned a degree in the U.S.; GRE (general and subject) recommended for domestic applicants.
- 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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

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	
MICR 720	Scientific Integrity	1
CHEM 790	Graduate Seminar (defense seminar)	1
or BIOC 790	Graduate Seminar	
Didactic Credits (601-689, 691; 700-789, 791; 800-889 and 891)		16 *
CHEM 798	Master's Thesis	6-10
or BIOC 798	Master's Thesis	
Total Credits Required		30
As part of total semester credits, the following departmental courses are recommended for students based on discipline:		
Analytical		
CHEM 632	Analytical Chemistry II	3
CHEM 730	Separations	2
CHEM 732	Advanced Survey of Analytical Chemistry	4
CHEM 736	Mass Spectrometry	2
Biochemistry and Molecular Biology		
BIOC 673	Methods of Biochemical Research	4
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	4
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		
CHEM 665	Survey of Physical Chemistry	4
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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Civil Engineering Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/civil-and-environmental-engineering/ (<http://ndsu.edu/programs/graduate/civil-and-environmental-engineering/>)
- **Department Web Site:**
ndsu.edu/ccee/ (<http://ndsu.edu/ccee/>)
- **Application Deadline:**
 Fall semester- February 15; Spring semester- September 15
- **Credential Offered:**
 Ph.D.
- **English Proficiency Requirements:**
 TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.

Admission and Application Requirement

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program prefers applicants to have a previous master's degree in civil engineering.

Civil Engineering Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/civil-and-environmental-engineering (<http://ndsu.edu/programs/graduate/civil-and-environmental-engineering/>)
- **Department Web Site:**
ndsu.edu/ccee/ (<http://ndsu.edu/ccee/>)
- **Application Deadline:**
Fall semester- February 15; Spring semester- September 15
- **Credential Offered:**
M.S.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

The Master of Science degree is a master's thesis or master's paper option. 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.

Curriculum for the Accelerated (4+1) program

Code	Title	Credits
*Required Courses		12
Management/Business/Communication		5
MGMT 630	Leadership in Organization	
CE 740	(**)	
CE 757	Pavement Evaluation and Rehabilitation (**)	
CM&E 603	Scheduling and Project Control	
CM&E 660	Infrastructure Management	
COMM 711	Communication Theory	
COMM 782		
MIS 770	Information Technology Audit and Risk Management	
NRM 702	Natural Resources Management Planning	
Engineering Tool		6
CE 641	Finite Element Analysis	
CE 739	Computational Methods for Engineering (**)	
ENGR 729		
GEOG 665	Remote Sensing of the Environment	
IME 661	Quality Assurance and Control	
IME 662	Total Quality In Industrial Management	
IME 663	Reliability Engineering	
IME 765	Data Analysis	
ME 711	Advanced Engineering Analysis	
STAT 661	Applied Regression Models	
STAT 726	Applied Regression and Analysis of Variance	
CE 790		1
CE 798		6
*Focus Area Courses - Select at least 12 credits from one of the following focus areas.		12
Focus Area 1 - Civil Infrastructure		

Structure		
CE 611	Design of Pre-stressed Concrete	2
CE 625	Bridge Evaluation and Rehabilitation	3
CE 630	Timber and Form Design	3
CE 645	Advanced Steel Design	2
CE 646	Basic Dynamics of Structures	3
CE 647	Stability of Structures	3
CE 720	Continuum Mechanics	3
CE 793	(Deep Learning for Engineers)	2
CM&E 665	Bridge Engineering and Management	3
Transportation		
CE 619	Pavement Design	3
CE 652	Fundamentals of Oil & Gas Pipeline: Design, Operation, Inspection & Maintenance	3
CE 654	Geometric Highway Design	3
CE 656	Railroad Planning and Design	3
CE 782	Introduction to Intelligent Infrastructure	3
Geotechnical		
CE 617	Slope Stability and Retaining Walls	3
CE 661	Foundation Engineering	3
CE 662	Designing with Geosynthetics	2
CE 663	Geotechnical Earthquake Engineering	3
CE 664	Advanced Soil Mechanics	2
Focus Area 2 - Water Environmental		
Environmental		
CE 610	Water & Wastewater Engineering	3
CE 671	Environmental Nanotechnology	3
CE 672	Solid and Hazardous Waste Management	3
CE 673		3
CE 679		3
CE 790	(Small Community Water Supply and Sanitation)	3
CE 696	Special Topics (Environmental Engineering Design)	3
Water Resources		
CE 621	Open Channel Flow	3
CE 674	Groundwater Sustainability Design	3
CE 676	Watershed Modeling	3
CE 677	Applied Hydrology	3
CE 776	Ground Water and Seepage	3
CE 793	(Advanced Fluid Mechanics)	3

* The above course list will be updated as new courses are considered or to be offered.

** Courses can be taken either in Category A or B but cannot be double counted.

*** Courses to be developed when the program starts.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Coatings and Polymeric Materials Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/coatings-polymeric-materials (<http://ndsu.edu/programs/graduate/coatings-polymeric-materials/>)
- **Department Web Site:**

ndsu.edu/cpm/ (<http://ndsu.edu/cpm/>)

- **Application Deadline:**
Fall semester priority deadline- April 15; Rolling admission schedule
- **Credential Offered:**
Ph.D.
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

The Ph.D. program requires the completion of 27 credits of letter-graded course work. A total of 90 credits are required for the degree.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have adequate preparation in a science or engineering field.

Coatings and Polymeric Materials Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/coatings-polymeric-materials (<http://ndsu.edu/programs/graduate/coatings-polymeric-materials/>)
- **Department Web Site:**
ndsu.edu/cpm/ (<http://ndsu.edu/cpm/>)
- **Application Deadline:**
Fall semester priority deadline- April 15; Rolling admission schedule
- **Credential Offered:**
M.S.
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

The M.S.. program requires the completion of 16 credits of letter-graded course work. A total of 30 credits are required for the degree.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have adequate preparation in a science or engineering field.

College Teaching Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/college-teaching-certificate (<http://ndsu.edu/programs/graduate/college-teaching-certificate/>)
- **Department Web Site:**
ndsu.edu/otl/instructional_resources/college_teaching_certificate/ (http://ndsu.edu/otl/instructional_resources/college_teaching_certificate/)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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 practicum will be designed in consultation with their department and a faculty teaching mentor.
- Prior to the start of the semester in which they plan to complete their teaching practicum, students must complete a practicum proposal form. In order to complete the Practicum Proposal Form, students need to have a conversation with their field experience supervisor about the practicum, including what class(es) they will teach and when they will be observed.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to submit a 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>).

Communication Doctorate

Department Information

- **Program Information:**
ndsus.edu/programs/graduate/communication/ (<http://ndsus.edu/programs/graduate/communication/>)
- **Department Web Site:**
ndsus.edu/communication/ (<http://ndsus.edu/communication/>)
- **Application Deadline:**
Fall semester- February 15
- **Credential Offered:**
Ph.D.
- **Test Requirement:**
GRE
- **English Proficiency Requirements:**
TOEFL iBT 100, IELTS 7 for admission; TOEFL iBT 100, IELTS 7 for teaching assistantship; Duolingo 125

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Core Courses		
COMM 700	Research Methods in Communication	3
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	3
COMM 711	Communication Theory	3
COMM 735 or COMM 783	Theories of Media, Technology, and Society (or organizational communication theory course) Advanced Organizational Communication I	3
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		
Exclusive of COMM 700. Maximum of 6 credit hours of independent study		12
Dissertation		
COMM 899	Doctoral Dissertation	
Total Credits		45

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to 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.

Communication Master's

Department Information

- Program Information:**
ndsu.edu/programs/graduate/communication (<http://ndsu.edu/programs/graduate/communication/>)
- Department Web Site:**
ndsu.edu/communication/ (<http://ndsu.edu/communication/>)
- Application Deadline:**
Fall semester - February 15
- Credential Offered:**
M.A., M.S.
- Test Requirement:**
GRE
- English Proficiency Requirements:**
TOEFL iBT 100, IELTS 7 for admission; TOEFL iBT 100, IELTS 7 for teaching assistantship; Duolingo 125

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have adequate study in communication, journalism or a related area.

Community Development Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/community-development (<http://ndsu.edu/programs/graduate/community-development/>)
- **Department Web Site:**
ndsu.edu/socanth/ (<http://ndsu.edu/socanth/>)
- **Application Deadline:**
Fall semester- February 15; Spring semester- September 15
- **Credential Offered:**
M.A., M.S.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

The degree is a multi-institutional, multi-disciplinary, online program in conjunction with the Interactive Distance Education Alliance (IDEA).

Master of Arts Curriculum

Code	Title	Credits
Core Courses Credits		16
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	
Specialization Track credits		15
General Elective Credits (Choose one of the following)		3
CED 752	Basic Grant Development and Management	
CED 753	Not-for-profit Management	
CED 755	Community Leadership and Capacity Building	

CED 798	Master's Thesis (or creative component (max 6 credits))	6-10
Total Credits Required		36

Natural Resource Management Track

Code	Title	Credits
CED 731	Ecological Economics	3
CED 733	Sustainable Communities	3
CED 735		3

Working with Native Communities Track

Code	Title	Credits
CED 721	Introduction to Native Community Development	3
CED 723	Building Native Community/Economic Capacity	3
CED 725		1
CED 726		1
CED 727		1
CED 728		1

Building Economic Capacity Track

Code	Title	Credits
CED 741	Economic Development Strategies and Programs	3
CED 742		1
CED 743		1
CED 744		1
CED 745	Land Management Planning	3

Master of Science Curriculum

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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Community Development Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/community-development (<http://ndsu.edu/programs/graduate/community-development/>)
- **Department Web Site:**
ndsu.edu/socanth/ (<http://ndsu.edu/socanth/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Community Planning and Resilience Master's

Department Information

- **Program Information:**
nds.edu/programs/graduate/community-planning-resilience (<http://nds.edu/programs/graduate/community-planning-resilience/>)
- **Credential Offered:**
M.S.

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
DREM 610	Comprehensive Emergency Management Planning	3
DREM 613 or DREM 683	Disaster Mitigation Disaster Recovery	3
DREM 720	Resilience for Designers, Planners, and Managers	3
GIS 655	Introduction to Geographic Information Systems	3
LA 722	Landscape Theory, Research, + Scholarly Methods	3
Electives		
Choose 14 credits from the following:		14
ARCH 789	Professional Topics in Architecture *	
DREM 661	Business Continuity & Crisis Management	
DREM 663	Voluntary Agency Disaster Services	
DREM 690	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		29

* Course may be repeated for credit.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Computer Science Doctorate

Department Information

- **Program Information:**
nds.edu/programs/graduate/computer-science (<http://nds.edu/programs/graduate/computer-science/>)
- **Department Web Site:**
nds.edu/computer-science (<http://nds.edu/computer-science/>)
- **Application Deadline:**
Fall semester- February 1; Spring semester-September 1
- **Credential Offered:**
Ph.D.
- **Test Requirement:**
GRE recommended for students seeking an assistantship.

- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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
- passed the comprehensive exam.
- completed 30 credits, of which 21 credits need to be didactic credits at the graduate level at NDSU.
- 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://www.ndsu.edu/graduate-school/apply-graduation/>) in Campus Connection 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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have a previous 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 following skills: 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.
 - Students with only a bachelor's degree should have substantial computer science experience, whether acquired through course work or professional experience.
 - Applicants 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.
- This program requires applicants to submit evidence of their potential for scholarship and independent research at the Ph.D. level.

Computer Science Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/computer-science (<http://ndsu.edu/programs/graduate/computer-science/>)
- **Department Web Site:**
ndsu.edu/computer-science (<http://ndsu.edu/computer-science/>)
- **Application Deadline:**
Fall semester- February 1; Spring semester- September 1
- **Credential Offered:**
M.S.
- **Test Requirement:**
GRE recommended for students seeking an assistantship.
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to 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

- 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.

Computer Science Education Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/computer-science-education (<http://ndsu.edu/programs/graduate/computer-science-education/>)
- **Department Web Site:**
ndsu.edu/computer-science (<http://ndsu.edu/computer-science/>)
- **Credential Offered:**
Certificate
- **English Proficiency Requirements:**
TOEFL iBT 79; IELTS 6.5

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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 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.

Required courses:

- CSCI 641: Introduction to Computer Science Education (3 Credits)
The course offers an overview of the main areas of Computer Science Education. The Active-Learning-Based Teaching Model; Research in Computer Science Education; Teaching Methods in Computer Science Education; and Lab-Based Teaching.
- 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 programming languages.
- CSCI 643: Introduction to Computer Programming (3 Credits)
Introduction to computer science including problem solving, algorithm development, and structured programming in a high-level language. Emphasis on design, coding, testing, and documentation of programs using accepted standards of style.
- CSCI 644: Data Structures and Algorithms (3 Credits)

Continuation of CSCI 643 that emphasizes more advanced programming language features and basic data structures. Students will learn to incorporate advanced (will be loaded into Courseleaf in March 2022).

Elective courses:

Students must choose two of the following:

- **CSCI 605: Principles in Cyber Security (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.
- **CSCI 650: Cloud Computing (3 Credits)**
The course discusses various topics and technologies related to Cloud Computing. Topics include distributed system models and enabling technologies, computer cluster, virtual machines, design of cloud computing platforms, cloud programming and software environments.
- **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 773. Foundations of the Digital Enterprise (3 Credits)**
This course covers current and emerging digital technologies, including web development, security, server management, and privacy.
- **Others (please discuss with your advisor)**

Digital Portfolio:

As part of the Graduate Certificate Program every student will prepare a Digital Portfolio with artifacts of accomplishment that is shareable. This Digital Portfolio will document the information necessary to teach any Computer Science course needed in the high school. The following should be developed as part of the portfolio:

- Develop Course syllabus (with course outline) for the proposed class/topic. Document course description, objectives, textbook/ software/ hardware support, course learning goals, educational practices, and assessment criteria.
- Document with the set of home assignments, in-class problems, quizzes, and exams, with specific grading criteria such as what factors will be graded, how they will be weighted, and how they will be translated into the overall grade.
- Develop a set of problems and solutions for every topic. Develop grading Rubrics for every project.
- Portfolios will be used to evaluate students and bolster accreditation.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Construction Management Master's

Department Information

- **Program Information:**
[ndsu.edu/programs/graduate/construction-management \(http://ndsu.edu/programs/graduate/construction-management/\)](http://ndsu.edu/programs/graduate/construction-management/)
- **Department Web Site:**
[ndsu.edu/ccee/ \(http://ndsu.edu/ccee/\)](http://ndsu.edu/ccee/)
- **Application Deadline:**
Fall semester - May 1; Spring semester- October 1
- **Credential Offered:**
M.S., M.Cons.M
- **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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Master of Science Curriculum

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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have completed a bachelor's degree in construction, engineering, architecture, or other related discipline.
- Requirements for the "Statement of Purpose":
 - Outline reasons for pursuing the Master of Science in Construction Management, emphasizing research objectives and qualifications that directly relate to one or more of the "Research Interests" of the CCEE faculty.
- Applicants must submit a two-page resume.

Master of Construction Management Curriculum

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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have completed a bachelor's degree in construction, engineering, architecture, or other related discipline.
 - Work experience in the construction industry can possibly be a substitute if degree is in another field.
- Applicants must submit a two-page resume.

Construction Management Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/construction-management (<http://ndsu.edu/programs/graduate/construction-management/>)
- **Department Web Site:**
ndsu.edu/ccee/ (<http://ndsu.edu/ccee/>)
- **Application Deadline:**
November 1
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have completed a bachelor's degree in construction, engineering, architecture, or other related discipline.
 - Work experience in the construction industry can possibly be a substitute if degree is in another field.
- Applicants must submit a two-page resume.

Counseling Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/counselor-education (<http://ndsu.edu/programs/graduate/counselor-education/>)
- **Department Web Site:**
ndsu.edu/ceduc/ (<http://ndsu.edu/ceduc/>)
- **Application Deadline:**
February 1
- **Credential Offered:**
M.S., M.Ed.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

The Counseling 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 (M.Ed.) Curriculum

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

Master of Science Curriculum

School Counseling Specialization

Code	Title	Credits
I. Professional Counseling Orientation and Ethics		
CNED 715	Professional Orientation and Ethics	3
II. Social and Cultural Diversity		
CNED 716	Social and Cultural Foundtions of Counseling	3
III. Helping Growth and Development		
CNED 712	Counseling Across the Lifespan	3
CNED 731	Counseling Children and Adolescents	3
IV. Career and Lifestyle Development		
CNED 714	Career Counseling and Testing	3
V. Counseling and Helping Relationships		
CNED 710	Counseling Techniques	3
CNED 711	Counseling Theory	3
CNED 732	Family Counseling	3
VI. Group Counseling and Group Work		
CNED 720	Group Counseling	3
VII. Assessment and Testing		
CNED 713	Assessment Techniques	3
VIII. Research & Program Evaluation		
EDUC 703	Research, Measurement and Program Evaluation	3

IX. School Counseling Practice		15
CNED 728	Guidance Administration and Consulting	
CNED 729	Professional K-12 School Counseling	
CNED 734	Dynamics of Addiction	
Teacher Education Course or Elective (two courses)		
X. Practicum		
CNED 794	Practicum/Internship	3
XI. Internship		
CNED 794	Practicum/Internship	3
XII. Research		
CNED 798	Master's Thesis	6
Total Credits		60

Clinical Mental Health Counseling

Code	Title	Credits
CNED 712	Counseling Across the Lifespan	3
CNED 734	Dynamics of Addiction	3
CNED 716	Social and Cultural Foundations of Counseling	3
CNED 710	Counseling Techniques	3
CNED 711	Counseling Theory	3
CNED 732	Family Counseling	3
CNED 720	Group Counseling	3
CNED 714	Career Counseling and Testing	3
CNED 713	Assessment Techniques	3
EDUC 703	Research, Measurement and Program Evaluation	3
CNED 731	Counseling Children and Adolescents	3
CNED 715	Professional Orientation and Ethics	3
CNED 794	Practicum/Internship	3
CNED 794	Practicum/Internship	6
CNED 798	Master's Thesis	3
Clinical Mental Health Counseling Program		
CNED 730	Crisis and Trauma in Counseling Practice	3
CNED 723	Psychopathology and Diagnosis for Counselors	3
CNED 863	Advanced Clinical Assessment, Report Writing, & Treatment Planning	3
CNED 890	Graduate Seminar	3
School Counseling Program		
CNED 728	Guidance Administration and Consulting	3
CNED 729	Professional K-12 School Counseling	3
Electives/Teacher Education Courses		6
Total Required Credits		60

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have earned 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*
 - *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.

Counselor Education and Supervision Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/counselor-education-and-supervision (<http://ndsu.edu/programs/graduate/counselor-education-and-supervision/>)
- **Department Web Site:**
ndsu.edu/ceduc/ (<http://ndsu.edu/ceduc/>)
- **Application Deadline:**
Fall- February 1
- **Credential Offered:**
Ph.D.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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	Instructional Theory and Practice in Counselor Education and Supervision	3
CNED 871	Advanced Multicultural Practice in Counselor Education and Supervision	3
CNED 872	Advanced Counseling Theories	3
CNED 876	Qualitative Research and Program Evaluation	3
CNED 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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have completed 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.
- Applicants must also:
 - Have 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 cultural sensitivity and awareness.
 - Show evidence of excellent oral and written communication skills, and professional potential.

- 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.
- 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

Criminal Justice Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/criminal-justice (<http://ndsu.edu/programs/graduate/criminal-justice/>)
- **Department Web Site:**
ndsu.edu/criminaljustice/ (<http://ndsu.edu/criminaljustice/>)
- **Application Deadline:**
April 1
- **Credential Offered:**
Ph.D.
- **English Proficiency Requirements:**
TOEFL ibT 100, IELTS 7, Duolingo 125; to qualify for assistantship TOEFL ibT 114, IELTS 8, Duolingo 135

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have an approved master's degree.
 - Applicants must 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.
- Applicants are required to have had one course in research methods and one course in statistics.
- Applicants should have adequate background preparation or demonstrated potential in the field of criminology or criminal justice.

Criminal Justice Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/criminal-justice/ (<http://ndsu.edu/programs/graduate/criminal-justice/>)
- **Department Web Site:**
ndsu.edu/criminaljustice/ (<http://ndsu.edu/criminaljustice/>)
- **Application Deadline:**
 Rolling admission schedule
- **Credential Offered:**
 M.S.
- **English Proficiency Requirements:**
 TOEFL ibT 100, IELTS 7, Duolingo 125; to qualify for assistantship TOEFL ibT 114, IELTS 8, Duolingo 135

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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 culminating project)	3
Total Credits		30

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have had one course in research methods and one course in statistics.
- Applicants must have documented adequate background preparation or demonstrated potential in the field of criminology or criminal justice

Critical Skills in Agricultural Sciences Certificate

- **Program Information:**

ndsu.edu/programs/graduate/critical-skills-agricultural-sciences (<http://ndsu.edu/programs/graduate/critical-skills-agricultural-sciences/>)

- **Credential Offered:**

Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
MICR 600	Course MICR 600 Not Found	3
MICR 720	Scientific Integrity	1
Choose 4 Credits of the following		4
ENT 770	Writing a Scientific Literature Review	
NRM 657	Applied Analysis Tools for Natural Resources and Agriculture	
PPTH 647	Fundamentals of Molecular Techniques in Agriculture	
PLSC 724	Field Design I	
STAT 713	Introduction to Data Science	
STAT 725	Applied Statistics	
PLSC 710	Professional Development I	
PLSC 711	Professional Development II	
PLSC 790	Graduate Seminar	
Total Credits		8

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (<https://catalog.ndsu.edu/graduate/admission-information/#admissionrequirements>) page.

Crop Production Certificate

Department Information

- **Program Information:**

ndsu.edu/programs/graduate/crop-production (<http://ndsu.edu/programs/graduate/crop-production/>)

- **Credential Offered:**

Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
SOIL 722	Soil Testing Basics	1
SOIL 726	Soil Conservation for Practitioners	1
Choose 6 Credits of the Following		6
PLSC 620	Integrated Forage and Cover Crops Production Management and Ecosystem Services	
PLSC 650	Sugarbeet Production	
PLSC 712	Oilseeds Production (Canola, Sunflower, and Flax)	
PLSC 713	Soybean and Corn Production	
PLSC 714	Small Grains Production	
SOIL 651	Digging Deeper: Understanding Soil Biology	

SOIL 724

Soil Salinity and Sodicty

Total Credits**8**

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Crop Protection Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/crop-protection (<http://ndsu.edu/programs/graduate/crop-protection/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
PPTH 624	Fundamental Plant Pathology	2
PLSC 623	Principles of Weed Science	3
Choose 3 Credits of the Following		3
ENT 701	Insect Pest Identification and Management: Corn & Wheat	
ENT 702	Insect Pest Identification and Management: Soybean & Pulses	
ENT 703	Insect Pest Identification and Management: Potatoes & Oilseeds	
PLSC 653	Advanced Weed Science	
PPTH 636	Fungicide: Basics, Resistance, and Emerging Trends	
PPTH 642	Practical Nematology	
PPTH 645	New Science and Technology in Crop Protection	
PPTH 662	Identification and Management of Non-Soybean Oil and Legume Crop Diseases	
PPTH 663	Identification and Management of Soybean and Corn Diseases	
PPTH 664	Identification and Management of Small Grain Diseases	
Total Credits		8

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Cybersecurity Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/cybersecurity (<http://ndsu.edu/programs/graduate/cybersecurity/>)
- **Department Web Site:**
ndsu.edu/computer-science (<http://ndsu.edu/computer-science/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
CSCI 603	Defensive Cybersecurity	3
CSCI 604	Ethical Hacking	3
CSCI 610	Cybersecurity 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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Data Science Master's

Department Information

- **Program Information:**
ndsus.edu/programs/graduate/data-science/ (<http://ndsus.edu/programs/graduate/data-science/>)
- **Department Web Site:**
ndsus.edu/data_science/ (http://ndsus.edu/data_science/)
- **Credential Offered:**
M.S.
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

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Code	Title	Credits
CSCI 622	Fundamentals of Data Engineering	3
CSCI 770	Data Science Ethics	3
DATA 720	Programming for Data Science	3
DATA 761 or STAT 712	Applied Machine Learning Applied Statistical Machine Learning	3
DATA 765	Applied Database Systems	3
STAT 711	Basic Computational Statistics using R	3
STAT 713	Introduction to Data Science	3
STAT 725	Applied Statistics	3
STAT 726	Applied Regression and Analysis of Variance	3
Electives - 6 credits required		6
CSCI 650	Cloud Computing	
CSCI 706	Data-Driven Security	
DATA 760	Applied Artificial Intelligence	
STAT 660	Applied Survey Sampling	
STAT 662	Introduction to Experimental Design	

STAT 714	Statistical Big Data Visualization
Total Credits	33

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Developmental Science Doctorate

Department Information

- Program Information:**
ndsu.edu/programs/graduate/developmental-science (<http://ndsu.edu/programs/graduate/developmental-science/>)
- Department Web Site:**
ndsu.edu/hdfs/graduate_studies/ds/ (http://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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.

Additional Requirements

- Teach one undergraduate course, with supervision, for course credit in HDFS 892 (<https://catalog.ndsu.edu/search/?P=HDFS%20892>) Graduate Teaching Experience. Must have first taken a teaching pedagogy course HDFS 802 (<https://catalog.ndsu.edu/search/?P=HDFS%20802>) Teaching and Learning in the Human Sciences, COMM 702 (<https://catalog.ndsu.edu/search/?P=COMM%20702>) Introduction to College Teaching in the Humanities and Social Sciences, or STEM 810 (<https://catalog.ndsu.edu/search/?P=STEM%20810>) Teaching College Science, as well as two courses out of HDFS 811 (<https://catalog.ndsu.edu/search/?P=HDFS%20811>) Developmental Concepts and Theories, HDFS 813 (<https://catalog.ndsu.edu/search/?P=HDFS%20813>) Social and Emotional Development Across the Lifespan, HDFS 815 (<https://catalog.ndsu.edu/search/?P=HDFS%20815>) Physical and Cognitive Development Across the Lifespan, and HDFS 817 (<https://catalog.ndsu.edu/search/?P=HDFS%20817>) 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 (<https://catalog.ndsu.edu/search/?P=HDFS%20798>) Master's Thesis, HDFS 893 (<https://catalog.ndsu.edu/search/?P=HDFS%20893>) Individual Study/Tutorial, and/or HDFS 899 (<https://catalog.ndsu.edu/search/?P=HDFS%20899>) Doctoral Dissertation.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires the following be submitted:
 - a. A statement of purpose that is 500 words or less and addresses the following:
 - What your professional goals are and how this graduate program will help you accomplish 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/).
 - The experiences you have had (e.g. informal, academic, employment, volunteer) that you see as related to this graduate program or your professional goal
 - b. Curriculum vitae or resume
 - c. Thesis or writing sample
- Applicants entering with a master's degree:
 - Must have a 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
- Applicants entering with a bachelor's degree:
 - Must have a bachelor's degree from accredited educational institution in child development, developmental psychology, human development, developmental science, or related area

Digital Marketing and Innovation Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/digital-marketing-and-innovation (<http://ndsu.edu/programs/graduate/digital-marketing-and-innovation/>)
- **Department Web Site:**
ndsu.edu/business/programs/graduate/graduate_certificates/ (http://ndsu.edu/business/programs/graduate/graduate_certificates/)
- **Credential Offered:**
 Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Discipline Based Education Research Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/discipline-based-education-research (<http://ndsu.edu/programs/graduate/discipline-based-education-research/>)
- **Department Web Site:**
ndsu.edu/dber/ (<http://ndsu.edu/dber/>)

- **Credential Offered:**
Ph.D. or Second Major (If proceed with dual major option)

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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. A Dual Major in DBER and a STEM discipline is an option.

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	

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to consult with faculty members in advance to determine a major advisor. Applicants will not be considered without a core faculty member who has agreed to serve as the advisor.
- 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.

Education Doctorate

Department Information

- **Program Information:**
ndsuh.edu/programs/graduate/education (<http://ndsuh.edu/programs/graduate/education/>)
- **Department Web Site:**
ndsuh.edu/education (<http://ndsuh.edu/education/>)
- **Application Deadline:**
Priority deadline - February 1; Final deadline - May 1
- **Credential Offered:**
Ph.D., Ed.D
- **English Proficiency Requirements:**
TOEFL iBT 88, IELTS 6.5, PTE Academic 59; Duolingo 110

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

A minimum of 90 semester hours beyond the bachelor's degree (a minimum of 60 semester hours beyond the master's degree) are required. The supervisory committee has authority to approve up to a maximum of 30 credit hours from a Masters degree or equivalent.

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 664: Universal Design for Learning in K-12 Settings (New course, pending approval)		
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)		15-18
EDUC 871	Planning and Conducting Needs Assessment	
EDUC 872	Qualitative Research Methods	
EDUC 873	Case-Based Educational Research and Statistics	
EDUC 881	Computer Data Management and Decision Making	
EDUC 882	Institutional Analysis Techniques	
EDUC 883	Survey Research	
EDUC 884	Program Evaluation Research	
EDUC 885	Structural Equation Modeling Fundamentals	
EDUC 886	Advanced Qualitative Research	
HDFS 856	Longitudinal Research Methods and Analysis	
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	
EDUC 812	Leadership in Educational Institutions	
EDUC 813	Educational Innovation and Change	
Science & Technology Education		
EDUC 821: Foundations of Science & Technology Education (New course, pending approval)		
EDUC 822: Teaching and Learning Science & Technology (New course, pending approval)		
EDUC 823: Advanced Topics in Science & Technology Education (New course, pending approval)		
Professional Emphasis Area		9-12
EDUC 899	Doctoral Dissertation	12

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to submit an essay stating how their career goals align with the mission and goals of the Education Doctoral Programs as described on the department website.

Education Master's

- **Program Information:**
ndsu.edu/programs/graduate/education (<http://ndsu.edu/programs/graduate/education/>)
- **Department Web Site:**
ndsu.edu/education (<http://ndsu.edu/education/>)
- **Application Deadline:**
Summer/Fall semester - March 15; Spring semester - October 15
- **Credential Offered:**
M.S., M.Ed.
- **English Proficiency Requirements:**
TOEFL iBT 88, IELTS 6.5, Duolingo 110

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Content Focused Option

Code	Title	Credits
Required Courses		12
EDUC 750	Reflective Practice and Research in Education	3
EDUC 751	Students and Their Learning	3
EDUC 752	Curriculum Design and Delivery	3
EDUC 753	Managing/ and Monitoring Learning	3
Major/Concentration		18
Practicum (M.Ed.) or Thesis (M.S.)		
EDUC 794 or EDUC 798	Practicum/Internship (or) 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		
HPER 645	Organization and Administration of Coordinated School Health Programs	3
HNES 737	School-wide Physical Activity Promotion	3
EDUC 751	Students and Their Learning	3
EDUC 790	Graduate Seminar (two 3-credit courses)	6
EDUC 794	Practicum/Internship	3

Focused Electives

Select 12 credits from the following:		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		
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
Computer Science Core		
CSCI 641	Introduction to Computer Science Education	3
CSCI 642	Problem Solving in Computer Science Education	3
CSCI 643	Introduction to Computer Programming (Introduction to Computer Programming, pending)	3
CSCI 644	Data Structures and Algorithms (Data Structures and Algorithms, pending)	3
Focused Electives		
Students must also choose two of the following:		6
CSCI 650	Cloud Computing	
CSCI 713	Software Development Processes	
CSCI 773	Foundations of the Digital Enterprise	
Capstone Experience		
EDUC 794	Practicum/Internship	3
Total Credits		33

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition to the Graduate School's required application materials, the **Teacher Licensure Option** requires:
 - 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.
 - 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 support your decision to apply to the Teacher Licensure program?
 - Pass the Praxis Core Academic Skills exam, meeting ND cut scores in reading, writing and math.
 - 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/whole-school-community-child/about/index.html>) (<https://www.cdc.gov/whole-school-community-child/about/>). The statement should:
 - i. Be a 500-700 word original essay
 - ii. Explicitly connect your experiences and career goals to the WSCC components
 - iii. Explain how NDSU's Education Master's program with a focus in *Whole Child Approaches* will help you achieve your career goals

Educational Leadership Master's

Department Information

- **Program Information:**
ndsuh.edu/programs/graduate/educational-leadership (<http://ndsuh.edu/programs/graduate/educational-leadership/>)
- **Department Web Site:**
ndsuh.edu/edol/ (<http://ndsuh.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

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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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to submit:
 - 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.
 - A leadership essay.

Electrical and Computer Engineering Doctorate

Department Information

- Program Information:**
ndsu.edu/programs/graduate/electrical-and-computer-engineering (<http://ndsu.edu/programs/graduate/electrical-and-computer-engineering/>)
- Department Web Site:**
ndsu.edu/ece/ (<http://ndsu.edu/ece/>)
- Application Deadline:**
 Fall semester - February 28; Spring semester - October 15
- Credential Offered:**
 Ph.D.
- 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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Graduate Course Work		
ECE 702	Advanced Research Topics (to be taken in the first year)	1
Didactic 7xx/8xx NDSU courses of which		15
At least 9 hours of didactic ECE 7xx courses		
At least 6 credit outside of ECE		
ECE 796	Special Topics	at most 12 credits

ECE 899

Doctoral Dissertation

at
least
30**Total Credits****60-90**

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program prefers applicants to contact and work with an ECE professor before coming to NDSU, such that the professor recommends the applicant 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.
 - Applicants should review the department website and contact a faculty member working in a research area in which they are interested in pursuing their graduate studies.
- If the applicant is not recommended by a professor, the program requires applicants to complete the GRE with a score of at least 145 Verbal and 155 Quantitative, and have a minimum GPA of 3.0 on their latest Electrical Engineering or Computer Engineering degree, either B.S. or M.S.
 - The GRE subject area test is not required.

Electrical and Computer Engineering Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/electrical-and-computer-engineering (<http://ndsu.edu/programs/graduate/electrical-and-computer-engineering/>)
- **Department Web Site:**
ndsu.edu/ece/ (<http://ndsu.edu/ece/>)
- **Application Deadline:**
Fall semester - February 28; Spring semester - October 15
- **Credential Offered:**
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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

Master of Science Curriculum

Code	Title	Credits
Minimum of 24 credit hours of graduate coursework subject to the following limitations and approved by the student's supervisory committee:		24
ECE 702	Advanced Research Topics (to be taken during first year)	
At most 6 hours of independent study, ECE 796 or ECE 896		
At least 15 hours of ECE courses		
At least 6 hours of didactic ECE 7xx courses, which excludes ECE 796		
ECE 798	Master's Thesis	6
Total Credits		30

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program prefers applicants to contact and work with an ECE professor before coming to NDSU, such that the professor recommends the applicant 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.

- Applicants should review the department website and contact a faculty member working in a research area in which they are interested in pursuing their graduate studies.
- If the applicant is not recommended by a professor, the program requires applicants to complete the GRE with a score of at least 145 Verbal and 155 Quantitative, and have a minimum GPA of 3.0 on their latest Electrical Engineering or Computer Engineering degree, either B.S. or M.S.
 - The GRE subject area test is not required.

Master of Engineering Curriculum

The Master of Engineering degree requires 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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to 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 applicants with substantial ECE industry experience.
 - The GRE subject area test is not required.

Energy Engineering- Vehicles Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/energy-engineering (<http://ndsu.edu/programs/graduate/energy-engineering/>)
- **Credential Offered:**
 Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Course		
Choose one course from the following options:		3
ME 751	Advanced Thermodynamics	
ME 761	Advanced Heat Transfer	
ME 762	Applied Multimode Heat Transfer	
ME 763	Advanced Transport Phenomena	
Additional Courses		
Choose two courses from the following options:		6
ABEN 673	Agricultural Power	
ECE 637	Power Electronics	
ME 669	Energy Storage Technology	
ME 684	Aerospace Propulsion	
ME 687	Internal Combustion Engines	
Total Credits		9

Note: A course applied to one certificate cannot also count towards a second Energy Engineering certificate

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Energy Engineering-Buildings Certificate

Department Information

- **Program Information:**
nds.u.edu/programs/graduate/energy-engineering (<http://nds.u.edu/programs/graduate/energy-engineering/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
Choose one course from the following options:		3
ME 751	Advanced Thermodynamics	
ME 761	Advanced Heat Transfer	
ME 762	Applied Multimode Heat Transfer	
ME 763	Advanced Transport Phenomena	
Additional Courses		
Choose two courses from the following options:		6
ABEN 652	Bioenvironmental Systems Design	
ME 669	Energy Storage Technology	
ME 685	Heating, Ventilation and Air Conditioning	
Total Credits		9

Note: A course applied to one certificate cannot also count towards a second Energy Engineering certificate

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Energy Engineering-Generation Certificate

Department Information

- **Program Information:**
nds.u.edu/programs/graduate/energy-engineering (<http://nds.u.edu/programs/graduate/energy-engineering/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Course		
Choose one course from the following options:		3
ME 751	Advanced Thermodynamics	
ME 761	Advanced Heat Transfer	
ME 762	Applied Multimode Heat Transfer	
ME 763	Advanced Transport Phenomena	
Additional Courses		
Choose two courses from the following options:		6

ABEN 656	Biobased Energy
ME 669	Energy Storage Technology
ME 670	Renewable Energy Technology
ME 681	Fundamentals of Energy Conversion
ME 682	Fuel Cell Science and Engineering

Total Credits**9**

Note: A course applied to one certificate cannot also count towards a second Energy Engineering certificate

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

English Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/english (<http://ndsu.edu/programs/graduate/english/>)
- **Department Web Site:**
ndsu.edu/english/ (<http://ndsu.edu/english/>)
- **Application Deadline:**
Application review begins February 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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

- Note that ENGL 764 (<https://catalog.ndsu.edu/search/?P=ENGL%20764>) Teaching Workshop for Writing Instructors is required of all GTAs who have not taken a similar class elsewhere.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have a Bachelor of Arts or a Bachelor of Science in English or a related field from an accredited college or university.

Enterprise Resource Planning Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/enterprise-resource-planning (<http://ndsu.edu/programs/graduate/enterprise-resource-planning/>)
- **Department Web Site:**
ndsu.edu/business/programs/graduate/mscm/ (<http://ndsu.edu/business/programs/graduate/mscm/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
MIS 650	Enterprise Systems	3
TL 725	ERP Configuration	3
TL 735	Practical Data Analytics	3
Total Credits		9

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Environmental and Conservation Sciences Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/environmental-and-conservation-sciences (<http://ndsu.edu/programs/graduate/environmental-and-conservation-sciences/>)
- **Department Web Site:**
ndsu.edu/ecs/ (<http://ndsu.edu/ecs/>)
- **Application Deadline:**
Fall semester international applications - May 1; Spring semester international applications- August 1; Domestic applications must be received at least one month prior to the start of the semester
- **Credential Offered:**
Ph.D.
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.

Code	Title	Credits
Environmental Social Sciences Track		
ECON 681	Natural Resource Economics	3
ECS 770	Environmental Law and Policy	3
HIST 634	Environmental History	3
or HIST 710	Research Seminar in North American History	
or HIST 780	Readings in World History	
NRM 631	National Environmental Policy Act & Environmental Impact Assessment	3
NRM 702	Natural Resources Management Planning	3

SOC 631	Environmental Sociology	3
Environmental Sciences Track		
CE 770	Hazardous Waste Site Remediation	3
GEOL 614	Hydrogeology	3
MICR 652	Microbial Ecology	3
PH 720		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		
ZOO 650		
ZOO 652		
ZOO 654		
ZOO 658		
Ecology and Evolution		
Select 3-9 credits of the following:		
BIOL 850		
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 & Environmental 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	
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	
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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have an ECS affiliated faculty member that has agreed to to admit the applicant to their lab and made arrangements for stipend and research funding.
 - Using the department website, applicants should contact ECS faculty members who share their research interests

Environmental and Conservation Sciences Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/environmental-and-conservation-sciences (<http://ndsu.edu/programs/graduate/environmental-and-conservation-sciences/>)
- **Department Web Site:**
ndsu.edu/ecs/ (<http://ndsu.edu/ecs/>)
- **Application Deadline:**
Fall semester international applications - May 1; Spring semester international applications- August 1; Domestic applications must be received at least one month prior to the start of the semester
- **Credential Offered:**
M.S.
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have an ECS affiliated faculty member that has agreed to to admit the applicant to their lab and made arrangements for stipend and research funding.
 - Using the department website, applicants should contact ECS faculty members who share their research interests

Environmental Engineering Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/civil-and-environmental-engineering (<http://ndsu.edu/programs/graduate/civil-and-environmental-engineering/>)
- **Department Web Site:**
ndsu.edu/ccee/ (<http://ndsu.edu/ccee/>)
- **Application Deadline:**
Fall semester - February 1; Spring semester - September 15
- **Credential Offered:**
M.S.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

The Master of Science degree is a Master's thesis option. The student and advisor develop a program of study consisting of at least 30 credit hours of graduate level material to meet individual educational goals.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to have adequate preparation in civil engineering.

Exercise and Nutrition Sciences Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/exercise-nutrition-sciences (<http://ndsu.edu/programs/graduate/exercise-nutrition-sciences/>)
- **Department Web Site:**
ndsu.edu/hnes (<http://ndsu.edu/hnes/>)
- **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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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 separate semesters)	15
HNES 899	Doctoral Dissertation
Total Credits (minimum)	60

Students Entering with a Bachelor's Degree

Code	Title	Credits
Research Core		21
STAT 725	Applied Statistics	
HNES 710	Introduction to Research Design and Methods in HNES	
12 additional credits in statistics and research methodology		
Recommended HNES Core		9
HNES 713	Graduate Exercise Physiology	
HNES 726	Nutrition in Wellness	
HNES 777	Scholarly Writing and Presenting in HNES	
Electives (up to 6 credits outside of HNES)		33
HNES 727	Physical Activity Epidemiology	
HNES 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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires **applicants with a master's degree**:
 - Have a completed 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.
- In addition, this program requires **applicants without an earned master's degree**:
 - Have a completed 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.

Exercise and Nutrition Sciences Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/exercise-nutrition-sciences (<http://ndsu.edu/programs/graduate/exercise-nutrition-sciences/>)
- **Department Web Site:**
ndsu.edu/hnes/ (<http://ndsu.edu/hnes/>)
- **Application Deadline:**
Applications will be reviewed until August 1 for fall and December 1 for spring.
- **Credential Offered:**
M.S.
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.

Electives and Culminating Experience

Plan A - Master's Thesis		
Electives		6
HNES 798	Master's Thesis	6
Plan B - Master's Paper		
Electives		9
HNES 797	Master's Paper	3
Plan C - Internship/Capstone		
Electives		9
Select one of the following options:		3
HNES 793	Individual Study	3
HNES 794	Practicum/Internship	3
HNES 795	Field Experience	3

Electives Courses

HNES 604	Adapted Physical Activity	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 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 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
Total credits		30

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following are required:

- GPA 3.0 or higher
- Undergraduate major of Dietetics, Exercise Science, or closely related field.
- Note in the 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.

Extension Education Master's

Department Information

- **Program Information:**
[ndsu.edu/programs/graduate/extension-education \(http://ndsu.edu/programs/graduate/extension-education/\)](http://ndsu.edu/programs/graduate/extension-education/)
- **Department Web Site:**
[ndsu.edu/agriculture/academics/academic-units/agricultural-and-family-education/extension-education \(http://ndsu.edu/agriculture/academics/academic-units/agricultural-and-family-education/extension-education/\)](http://ndsu.edu/agriculture/academics/academic-units/agricultural-and-family-education/extension-education/)
- **Application Deadline:**
3 weeks prior to the start of a new semester.
- **Credential Offered:**
M.S., M.Ed.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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 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**

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to submit a statement of purpose that addresses the question, "How will this degree help me achieve my professional goals?"
- This program requires applicants to submit a letter from a faculty member/specialist expressing their willingness and ability to mentor the candidate in their area of interest.

Extension Education Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/extension-education (<http://ndsu.edu/programs/graduate/extension-education/>)
- **Department Web Site:**
ndsu.edu/agriculture/academics/academic-units/agricultural-and-family-education/extension-education (<http://ndsu.edu/agriculture/academics/academic-units/agricultural-and-family-education/extension-education/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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 with Technology	3

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Family and Consumer Science Education Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/family-and-consumer-science-education (<http://ndsu.edu/programs/graduate/family-and-consumer-science-education/>)
- **Department Web Site:**
ndsu.edu/agriculture/academics/academic-units/agricultural-and-family-education (<http://ndsu.edu/agriculture/academics/academic-units/agricultural-and-family-education/>)
- **Application Deadline:**
Applications will be accepted up to 3 weeks prior to the start of a new semester.
- **Credential Offered:**
M.S., M.Ed.

- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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 with Technology	
H&CE 776	Research Design in Family and Consumer Sciences	
Field Experiences		11
H&CE 687P	Student Teaching	
H&CE 794	(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		12-15
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 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		
H&CE 795		
Culminating Experience		3-10
H&CE 794	(Action Research)	
or H&CE 798		
Total Credits		30

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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires the following for the Teacher Licensure option:
 - Applicants 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'
- This program requires the following for the Licensed Teachers option:
 - Applicants must submit 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 applicant must have at least a 3.0 undergraduate GPA.
 - The School of Education reserves the right to obtain additional information about the student's professional competence from qualified professionals.

Family Financial Planning Certificate

Department Information

- Program Information:**
ndsu.edu/programs/graduate/family-financial-planning (<http://ndsu.edu/programs/graduate/family-financial-planning/>)
- Department Web Site:**
ndsu.edu/hdfs (<http://ndsu.edu/hdfs/>)

- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Family Financial Planning Certificate (Financial Counseling Option)

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

Family Nurse Practitioner (DNP) Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/nursing/ (<http://ndsu.edu/programs/graduate/nursing/>)
- **Department Web Site:**
ndsu.edu/nursing/ (<http://ndsu.edu/nursing/>)
- **Application Deadline:**
 Fall Semester: February 15 for BSN to DNP
- **Credential Offered:**
 D.N.P
- **English Proficiency Requirements:**
 TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Core Course Requirements		
NURS 802	Ethics and Health Policy in Nursing	2
NURS 804	Nursing Research/Evidence Based Practice	3
NURS 806	Health Care Delivery Systems and Financing	2
NURS 808	Informatics in Advanced Nursing Practice	2
Family Nurse Practitioner Requirements (DNP)		
NURS 810	Health Promotion and Disease Prevention	2
NURS 812	Advanced Health Assessment	3
NURS 812P	Assessment Practicum	6
NURS 814	Advanced Pathophysiology Across the Lifespan I	2
NURS 815	Population Health/Epidemiology for Advanced Practice Nursing	3
NURS 816	Advanced Pathophysiology Across the Lifespan II	2
NURS 820	Advanced Practice Roles	3
NURS 828	An Introduction to Primary Care (Common Medical Conditions)	2
NURS 830	Clinical Applications	3
NURS 831	Advanced Pharmacology I	2
NURS 832	Advanced Pharmacology II	2
NURS 833	Family Primary Care I: Assessment and Management	3

NURS 833P	Family Primary Care:Residency I	6
NURS 834	Family Primary Care II:Assessment and Management	3
NURS 834P	Family Primary Care:Residency II	6
NURS 835	Family Primary Care III: Assessment and Management	2
NURS 835P	Practicum IV: FNP Role Integration	6
NURS 836P	Practicum V: FNP Role Integration	7
NURS 850P	Family Primary Care: Specialty Practicum	3
NURS 880	Interprofessional Collaborative Practice	2
STAT 725	Applied Statistics	3
NURS 899S	Clinical Dissertation (2 credits per semester)	6
Total Credits		86

- 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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires the following:
 - Baccalaureate degree in nursing from a nationally accredited nursing program.
 - Undergraduate coursework in research and health assessment.
 - Current unencumbered RN licensure
 - Three references: two from professional colleagues that address clinical competence and potential for graduate education, and one other reference
 - Written narrative of professional experience and future goals.
 - 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.

Food Safety Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/food-safety (<http://ndsu.edu/programs/graduate/food-safety/>)
- **Credential Offered:**
 Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Certificate Requirements

Code	Title	Credits
CFS 652	Food Laws and Regulations	3
CFS 673	Food Safety	3
MICR 653	Food Microbiology	2
Total Credits		8

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Foundations of Mental Health Care Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/foundations-mental-health-care/ (<http://ndsu.edu/programs/graduate/foundations-mental-health-care/>)
- **Credential Offered:**
 Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
CNED 606	Psychopathology in the Health Professions	3
PHRM 668	Psychopharmacology for Health professionals	3
CNED 705	Foundations of Mental Health Practice	3
Total Credits		9

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Fundamentals of Software Engineering Certificate

Department Information

- **Credential Offered:**
 Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Fundamentals of Software Engineering

Code	Title	Credits
CSCI 713	Software Development Processes	3
CSCI 716	Software Design	3
CSCI 718	Software Testing and Debugging	3
Total Credits		9

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Genomics, Phenomics, and Bioinformatics Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/genomics-phenomics-and-bioinformatics/ (<http://ndsu.edu/programs/graduate/genomics-phenomics-and-bioinformatics/>)
- **Department Web Site:**

ndsu.edu/gpb/ (<http://ndsu.edu/gpb/>)

• **Application Deadline:**

Fall semester international applications - May 1; Spring semester international applications- October 1; Domestic applications must be received at least one month prior to the start of the semester

• **Credential Offered:**

Ph.D.

• **English Proficiency Requirements:**

TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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		
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		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	Quantitative Genetics I	1
ANSC 752	Quantitative Genetics II	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		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		1

ANSC 851		1
ANSC 852		1
ANSC 856		1
BIOL 842	Quantitative Biology	3
BIOL 877		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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires the following for the 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.
- The following for the 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.

Genomics, Phenomics, and Bioinformatics Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/genomics-phenomics-and-bioinformatics (<http://ndsu.edu/programs/graduate/genomics-phenomics-and-bioinformatics/>)
- **Department Web Site:**
ndsu.edu/gpb/ (<http://ndsu.edu/gpb/>)
- **Application Deadline:**
 Fall semester international applications - May 1; Spring semester international applications- October 1; Domestic applications must be received at least one month prior to the start of the semester
- **Credential Offered:**
 M.S.
- **English Proficiency Requirements:**
 TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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		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	Quantitative Genetics I	1
ANSC 752	Quantitative Genetics II	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		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		3
PPTH 759	Host-Parasite Genetics	3
PSCI 617	Pharmacogenomics	2
Computer Science, Statistics, and Computational Biology Electives		
ANSC 850		1
ANSC 851		1
ANSC 852		1
ANSC 856		1
BIOL 842	Quantitative Biology	3
BIOL 877		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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires the following for the 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.
- The following for the 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.

Geographic Information Systems Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/gis-and-remote-sensing (<http://ndsu.edu/programs/graduate/gis-and-remote-sensing/>)
- **Department Web Site:**
ndsu.edu/drem/programs/graduate/#c860765 (<http://ndsu.edu/drem/programs/graduate/#c860765>)

- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
GEOG 655	Introduction to Geographic Information Systems	3
GEOG 656	Advanced Geographic Information Systems	3
Choose one course from the following:		3
GEOG 665	Remote Sensing of the Environment	
GEOG 680	Geographic Information Systems Pattern Analysis and Modeling	
GEOG 696	Special Topics	
Total Credits		9

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Gerontology Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/gerontology/ (<http://ndsu.edu/programs/graduate/gerontology/>)
- **Department Web Site:**
ndsu.edu/hdfs/academics/gerontology_dual_phd/ (http://ndsu.edu/hdfs/academics/gerontology_dual_phd/)
- **Application Deadline:**
Based on first major requirements.
- **Credential Offered:**
Ph.D. Dual Major
- **English Proficiency Requirements:**
Based on first major requirements.

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

This program is a dual-major option.

Code	Title	Credits
ID 705	Interdisciplinary Perspectives in Environments for Aging	3
HDFS 723 or HDFS 725	Foundations in Integrative Aging Studies Socioemotional and Cognitive Well-being throughout Adulthood	3
HDFS 760	Aging Policy and Advocacy	3
EDUC 851 or EDUC 853	Adult Learning Instructional Methods for Adult Learners	3
PSYC 671 or SOC 640 or SOC 641	The Psychology Of Aging Sociology Of Aging Death and Dying	3

Other Requirements:

- Must meet the requirements above, as well as for the first major
- Dissertation on a Gerontology-related topic

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- Additional admission requirements are based on the primary program admission requirements.

Gerontology Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/gerontology (<http://ndsu.edu/programs/graduate/gerontology/>)
- **Department Web Site:**
ndsu.edu/hdfs/ (<http://ndsu.edu/hdfs/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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	
ID 705	Interdisciplinary Perspectives in Environments for Aging	
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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

History Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/history (<http://ndsu.edu/programs/graduate/history/>)
- **Department Web Site:**
ndsu.edu/schoolofhumanities/graduate_program/ (http://ndsu.edu/schoolofhumanities/graduate_program/)
- **Application Deadline:**
April 1 for assistantship consideration
- **Credential Offered:**
Ph.D.

- **English Proficiency Requirements:**
TOEFL ibt 100; IELTS 7; Duolingo 125

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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	

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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program gives preference 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.

History Master's

Department Information

- **Program Information:**
ndsus.edu/programs/graduate/history/ (<http://ndsus.edu/programs/graduate/history/>)
- **Department Web Site:**
ndsus.edu/schoolofhumanities/graduate_program/ (http://ndsus.edu/schoolofhumanities/graduate_program/)
- **Application Deadline:**
April 1 for assistantship consideration
- **Credential Offered:**
M.A., M.S.
- **English Proficiency Requirements:**
TOEFL ibt 100; IELTS 7; Duolingo 125

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Master of Arts Curriculum

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 graduate coursework, of which at least two credits must be didactic.		9
HIST 798	Master's Thesis	8
Total Credits		30

- The Master of Arts requires proficiency in at least one foreign language. 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.

Master of Science Curriculum

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
Didactic coursework (601-689, 691; 700-789, 791). Up to 3 credits may be from outside of History.		12
HIST 797	Master's Paper	3
Total Credits		30

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to:
 - 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.

Horticulture and Urban Agriculture Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/horticulture-and-urban-agriculture/ (<http://ndsu.edu/programs/graduate/horticulture-and-urban-agriculture/>)
- **Department Web Site:**
ndsu.edu/agriculture/academics/academic-units/plant-sciences/ (<http://ndsu.edu/agriculture/academics/academic-units/plant-sciences/>)
- **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 be 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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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 graduate-level courses (13 must be didactic**)		16
Students focusing on Plant Breeding and Genetics must take and earn a B or better in		
PLSC 631	Intermediate Genetics	
PLSC 718	Genetics & Plant Improvement	

Code	Title	Credits
M.S. Plan B - Master's Paper Option		30
PLSC 724	Field Design I	3
Addition graduate credits (18 credits must be didactic**)		23
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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Horticulture Management Certificate

Department Information

- Program Information:**
ndsu.edu/programs/graduate/horticulture-management (<http://ndsu.edu/programs/graduate/horticulture-management/>)
- Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Choose 8 Credits of the following		8
PLSC 615	Vegetable Crop Production	
PLSC 616	Fruit Crop Production	
PLSC 625	Potato Science	
PLSC 685	Arboriculture Science	
PPTH 657	Landscape Plant Pathology	
Total Credits		8

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Human Development and Family Science Master's

Department Information

- **Department Web Site:**
ndsu.edu/hdfs/academics/masters_degree/ (http://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.
- **English Proficiency Requirements:**
TOEFL iBT 100 (subscores of at least 24 for speaking and 21 for writing); IELTS 7 ; Duolingo 125

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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	
HDFS 790	Graduate Seminar (Focused on Aging in Context)	
ID 705	Interdisciplinary Perspectives in Environments for Aging	
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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to 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.
- The statement of purpose should address the following, in 500 words or less:
 - How your interest in this field developed.
 - Why you chose our program at NDSU.
 - The experiences you have had (e.g. informal, academic, employment, volunteer) that you see as related to this graduate program or your professional goals.
 - What your professional goals are and how this graduate program will help you accomplish your professional goals.

Industrial and Manufacturing Engineering Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/industrial-and-manufacturing-engineering (<http://ndsu.edu/programs/graduate/industrial-and-manufacturing-engineering/>)
- **Department Web Site:**
ndsu.edu/ime/ (<http://ndsu.edu/ime/>)
- **Application Deadline:**
 March 1 is the priority fall deadline for funding consideration; August 15 for spring and summer. Domestic applications due one month prior to start of semester.
- **Credential Offered:**
 Ph.D.
- **Test Requirement:**
 GRE

- **English Proficiency Requirements:**
TOEFL ibt 71; IELTS 6.0; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to 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

Industrial and Manufacturing Engineering Master's

Department Information

- **Program Information:**
ndsus.edu/programs/graduate/industrial-and-manufacturing-engineering/ (<http://ndsus.edu/programs/graduate/industrial-and-manufacturing-engineering/>)
- **Department Web Site:**
ndsus.edu/ime/ (<http://ndsus.edu/ime/>)
- **Application Deadline:**
March 1 is the priority fall deadline for funding consideration; August 15 for spring and summer. Domestic applications due one month prior to start of semester.
- **Credential Offered:**
M.S., M.Engr

- **Test Requirement:**
GRE
- **English Proficiency Requirements:**
TOEFL ibt 71; IELTS 6.0; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Master of Science Curriculum

A minimum of 15 credits from didactic IME courses (numbered IME 601-689 and IME 700-789) is required.

In addition, a minimum of 6 credits of other courses is required for a department-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) is required for a department-funded student (no matter GTA or GRA). If a student is funded by himself/herself, then the minimum requirement of the graduate seminar is 1 credit.

In addition, a minimum of 6 credits of thesis (IME 798) is required and all graduate students are required to submit two articles to a refereed journal or refereed conference based on their thesis research.

Code	Title	Credits
IME Didactic course (601-689, 700-789)		15
IME 790	Graduate Seminar (3 credits for department-funded students, 1 credit for self-paying students)	
Additional course credits (6 credits for department-funded students, 8 credit for self-paying students)		
IME 798	Master's Thesis	6-10

Master of Engineering Curriculum

The Master of Engineering degree requires thirty credits of graduate-level study. All students are expected to demonstrate an acceptable level of achievement in the core competencies defined for the designated degree. This achievement may be demonstrated through coursework completed prior to admission or through courses successfully passed while attending North Dakota State University. All core competencies for the degree must be achieved prior to completion of the degree program. It is important to note that currently IME has limited scheduled 700 level classes and additional resources (instructors) may be required to expand the class offering. In summary, a Master of Engineering requires the completion of 30 credit hours of graduate level didactic classes.

Code	Title	Credits
Core Competencies		
IME 600-level courses		
IME 630	Process Engineering	3
IME 631	Production Engineering	3
IME 660	Evaluation of Engineering Data	3
IME 670	Operations Research I	3
IME 672	Simulation of Business and Industrial Systems	3
IME 700-level course (choose at least three credits from the following)		3
IME 765	Data Analysis	
IME 770	Quantitative Modeling	
IME 771	Probabilistic and Deterministic Methods	
Electives (choose a minimum of 12 credits from the following list)		12
IME 611	Human Factors Engineering	
IME 627	Packaging for Electronics	
IME 633	Additive Manufacturing	
IME 635	Plastics and Injection Molding Manufacturing	
IME 640	Engineering Economy	
IME 650	Systems Engineering and Management	

IME 651	Logistics Engineering and Management
IME 653	Hospital Management Engineering
IME 656	Program and Project Management
IME 661	Quality Assurance and Control
IME 662	Total Quality In Industrial Management
IME 663	Reliability Engineering
IME 664	Reliability Analysis
IME 680	Production and Inventory Control
IME 682	Automated Manufacturing Systems
IME 685	Industrial and Manufacturing Facility Design
IME 765	Data Analysis
IME 770	Quantitative Modeling
IME 771	Probabilistic and Deterministic Methods
IME 774	Neural Networks
IME 775	Data Driven Modeling and Optimization
IME 777	Graph Data Analytics

Total Credits **30**

Notes

- Maximum of 9 transfer credits
- The selected IME 700-level core course(s) cannot be double counted as elective course(s).
- With approval, students may substitute up to 6 credits with graduate, didactic-level courses from other departments.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, this program requires applicants to 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

Intercollegiate Athletic Administration Certificate

Department Information

- **Program Information:**
ndsusportmanagement.com (<http://ndsusportmanagement.com>)
- **Department Web Site:**
ndsuhnes.com (<http://ndsuhnes.com>)
- **Credential Offered:**
 Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

International Agribusiness Master's

Department Information

- Program Information:**
ndsu.edu/programs/graduate/international-agribusiness (<http://ndsu.edu/programs/graduate/international-agribusiness/>)
- Department Web Site:**
ndsu.edu/agriculture/academics/academic-units/agribusiness-and-applied-economics (<http://ndsu.edu/agriculture/academics/academic-units/agribusiness-and-applied-economics/>)
- Application Deadline:**
March 1 for fall semester, October 1 for spring semester
- Credential Offered:**
M.S.
- Test Requirement:**
GMAT or GRE
- English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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 AGECE 798	Master's Thesis	
Select a minimum of 6 credits of the following:		6
ECON 610	Econometrics	
ECON 710	Advanced Econometrics	
AGEC 739	Analytical Methods for Applied Economics	
Or other approved quantitative coursework		
Approved Electives		1 - 9
Total Credits		30 (minimum)

Students may participate in an international internship, a study abroad program, or select six additional credits of course work at NDSU related to international agribusiness.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- In addition, 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.

Landscape Architecture Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/landscape-architecture (<http://ndsu.edu/programs/graduate/landscape-architecture/>)
- **Department Web Site:**
ndsu.edu/landscapearchitecture/ (<http://ndsu.edu/landscapearchitecture/>)
- **Application Deadline:**
February 1 for fall semester, portfolio required
- **Credential Offered:**
M.L.A.
- **English Proficiency Requirements:**
TOEFL ibt 80; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

Master of Landscape Architecture

Code	Title	Credits
LA 644	Advanced Construction Drawings + Documentation	4
LA 722	Landscape Theory, Research, + Scholarly Methods	3
LA 771	Performance Based Design Studio	6
LA 772	Landscape Architecture Graduate Thesis	6
LA 763	Landscape Architecture Thesis Research & Programming	3
LA 781	Professional Practice	3
LA 789	Professional Topics in Landscape Architecture	3
LA 789	Professional Topics in Landscape Architecture	3
LA 789	Professional Topics in Landscape Architecture	3
or NON-LA GRADUATE ELECTIVE		
LA 789	Professional Topics in Landscape Architecture	3
Total Credits		37

Second year coursework requires admission to selective admission program. Fifth year coursework requires admission to graduate admission program. Contact adviser for additional information.

* Indicates credits are not semester-specific

Undergraduate credits - 130 Graduate credits - 30

Student Objectives:

- Provide a strong design research based master's degree to address the current needs of the profession.
- Allow the program to be more competitive regionally to attract students from primarily North Dakota and the region.
- NDSU is a research-intensive institution, thus having landscape architecture program as a member of the graduate school provides students with a higher level of education.

North Dakota State University:

- Provide the state of North Dakota with graduates of the highest order to address real-world concerns.
- Provide a better path to sustained growth.
- Provide better footing for collaboration with other graduate units.

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.
- 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 Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/landscape-architecture (<http://ndsu.edu/programs/graduate/landscape-architecture/>)
- **Department Web Site:**
ndsu.edu/business/programs/graduate/graduate_certificates/ (http://ndsu.edu/business/programs/graduate/graduate_certificates/)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

- Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Leadership in Physical Education and Sport Coaching Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/leadership-physical-education-and-sport-coaching (<http://ndsu.edu/programs/graduate/leadership-physical-education-and-sport-coaching/>)
- **Department Web Site:**
ndsu.edu/education/ (<http://ndsu.edu/education/>)
- **Application Deadline:**
Applications are accepted on a rolling basis and students may be admitted for fall, spring, and summer semesters.
- **Credential Offered:**
M.Ed.

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition, the following are required:

- 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.

Malting and Brewing Certificate

Department Information

- **Program Information:**
nds.edu/programs/graduate/malting-brewing (<http://nds.edu/programs/graduate/malting-brewing/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
CFS 650	Cereal Technology	3
CFS 672	Cereal and Food Fermentation	3
CFS 761	Malting and Brewing	2

MICR 653	Food Microbiology	2
MICR 653L	Food Microbiology Laboratory	1
Total Credits		11

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Management of Software Engineering Projects Certificate

Department Information

- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
CSCI 714	Software Project Planning and Estimation	3
CSCI 715	Software Requirements Definition and Analysis	3
Elective		
CSCI 702 or CSCI 773	Survey of Cybersecurity Foundations of the Digital Enterprise	3
Total Credits		9

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Materials and Nanotechnology Doctorate

Department Information

- **Program Information:**
nds.edu/programs/graduate/materials-and-nanotechnology (<http://nds.edu/programs/graduate/materials-and-nanotechnology/>)
- **Department Web Site:**
nds.edu/materials_nanotechnology/ (http://nds.edu/materials_nanotechnology/)
- **Application Deadline:**
April 1 for fall semester.
- **Credential Offered:**
Ph.D.
- **Test Requirement:**
GRE recommended
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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 Applications	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		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

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following is required :

- A degree in the discipline of chemistry, engineering, material science and engineering, physics, polymer science, polymer engineering, or related field.

Materials and Nanotechnology Masters

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/materials-and-nanotechnology (<http://ndsu.edu/programs/graduate/materials-and-nanotechnology/>)
- **Department Web Site:**
ndsu.edu/materials_nanotechnology (http://ndsu.edu/materials_nanotechnology/)
- **Application Deadline:**
 April 1 for fall semester
- **Credential Offered:**
 M.S.
- **Test Requirement:**
 GRE recommended
- **English Proficiency Requirements:**
 TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.

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).

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (<https://catalog.ndsu.edu/graduate/admission-information/>) page. In addition to these requirements, the following is required :

- A degree in the discipline of chemistry, engineering, material science and engineering, physics, polymer science, polymer engineering, or related field.

Mathematics Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/mathematics (<http://ndsu.edu/programs/graduate/mathematics/>)
- **Department Web Site:**
ndsu.edu/math (<http://ndsu.edu/math/>)
- **Application Deadline:**
Early review begins January 31 rolling through March 31 or until full.
- **Credential Offered:**
Ph.D.

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

- 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.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition, the following are also required:

- A cumulative grade point average (CGPA) of at least 3.0 or equivalent in all advanced mathematics courses at the baccalaureate level
- Meet the English proficiency requirements (<https://catalog.ndsu.edu/graduate/admission-information/#internationalapplicantstext>) for applicants

Mathematics Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/mathematics/
- **Department Web Site:**
ndsu.edu/math/
- **Application Deadline:**
Early review begins January 31 rolling through March 31 or until full.
- **Credential Offered:**
M.S.

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

At least 30 credit hours in approved graduate-level mathematics course work are required for both options.

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.

Master of Science

Accelerated Master of Science

Code	Title	Credits
600-level electives		
Select from mathematics courses numbered 600-689.		15
700 / 800-level electives		
Select from mathematics courses numbered 700-789 or 820-889.		15
Paper requirement		
MATH 797	Master's Paper	1-3
Total Credits		31-33

Students must meet all requirements of the Mathematics bachelor program. For the master's degree, students must earn at least 30 graduate credits.

- Up to 15 credits from the above list may count toward the bachelor program requirements.
- A thesis or expository paper will be completed under supervision of a mathematics faculty member and defended at an oral examination administered by the student's supervisory committee
- Students need to earn a B in any of the courses that count towards this program. Failure to do so will lead to removal from the program. After removal, students are not eligible to re-apply to the accelerated program but may apply to the regular graduate program.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Mechanical Engineering Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/mechanical-engineering (<http://ndsu.edu/programs/graduate/mechanical-engineering/>)
- **Department Web Site:**
ndsu.edu/me/ (<http://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.
- **Test Requirement:**
GRE recommended
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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).

Doctoral Program Course Requirements ¹

Code	Title	Credits
Master's Coursework requirements or MS Degree: 30 Credits		30
Didactic Courses (601-689, 701-789): 24 Credits		
ME 700-Level: 9 Credits		9
700-level: 6 Credits		6
ME 600 or ME 700-level: 6 Credits		6
600 or 700-level: 3 Credits		3
Dissertation Research: 24 Credits		24
ME 899	Doctoral Dissertation	
Additional Credits: 12 Credits		12
Can include didactic courses, individual study, field experience, special topics, or research credits		
Seminar: 3 Credits		3
ME 790	Graduate Seminar	
Continuing Enrollment Credits ²		
ME 898	Continuing Enrollment ²	
Total Credits		93

¹ Requires 60 credits beyond a master's degree or 90 credits beyond a bachelor's degree.

² ME 898 is a lower cost option for students who have completed their defense and still need to finish writing their dissertation. International students may not be eligible for this credit and should check with the International Office for guidance.

- In addition to the 60 or 90 credits of Ph.D. coursework, students are required to enroll in the department's graduate seminar series, ME 790 (not exceeding three semesters).

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following are also required:

- Baccalaureate degree in Mechanical Engineering or a closely related field.
- International students must provide language test scores such as Duolingo, TOEFL, or IELTS. Minimum requirement for admission consideration are 105 for Duolingo, 71 for TOEFL iBT, or 6.0 for IELTS score.
- GRE general test score with a minimum of 300 (combined Quantitative and Verbal) with a minimum quantitative score of 155 is strongly recommended but is not required for international students.

Mechanical Engineering Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/mechanical-engineering (<http://ndsu.edu/programs/graduate/mechanical-engineering/>)
- **Department Web Site:**
ndsu.edu/me/ (<http://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:**
M.S.; M.Engr
- **Test Requirement:**
GRE recommended
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Master of Science Curriculum

Masters Thesis Course Requirements

Code	Title	Credits
Didactic Courses (601-689, 701-789)		
ME 711	Advanced Engineering Analysis	3
ME Courses (700-789, 791)		6
ME Courses (601-689, 691;700-789, 791)		6
Any graduate didactic course (601-689, 691;700-789, 791)		3
Additional Credits ¹		6
Any approved 600 to 700-level courses, including 793, 696, 796		
Graduate Seminar		3
ME 790	Graduate Seminar	
Research Credits ¹		6
ME 798	Master's Thesis	

Continuing Enrollment Credits ²

ME 898	Continuing Enrollment	
Total Credits		33

Masters Paper Course Requirements

Code	Title	Credits
Didactic Courses (601-689, 701-789)		
ME 711	Advanced Engineering Analysis	3
ME 700-Level Courses: 6 credits		6
ME Prefixed 600 or 700-level: 9 credits		9
Any Approved 600 to 700-level didactic course: 3 Credits		3
Additional Credits: 6 Credits		6
Any approved 600 to 700-level courses, including 793, 696, 796		
Research: 3 Credits		3
ME 797	Master's Paper	
Seminar: 3 Credits		3
ME 790	Graduate Seminar	
Continuing Enrollment Credits ²		
ME 898	Continuing Enrollment	
Total Credits		33

¹Students can choose to take 9 credits of research provided they have at least one published journal article. This reduces the coursework by one class (3 credits).

²ME 898 is a lower cost option for students who have completed their defense and still need to finish writing their thesis/paper. International students may not be eligible for this credit and should check with the International Office for guidance.

- In addition to the 30 credits of Master's coursework, students are required to enroll in the department's graduate seminar series, ME 790 (not exceeding three semesters).

Master of Engineering Curriculum

Code	Title	Credits
600 or 700-level didactic courses (including a minimum of 18 credits from ME and a minimum of 9 credits from 700-level ME courses)		24
		Minimum
Other 600 or 700-level courses (e.g. ME 793, ME 795, ME 696/796)		6
		Maximum
Total Credits		30

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following are also required:

- Baccalaureate degree in Mechanical Engineering or a closely related field.
- International students must provide language test scores such as Duolingo, TOEFL, or IELTS. Minimum requirements for admission consideration are 105 for Duolingo, 71 for TOEFL iBT, or 6.0 for IELTS score.
- GRE general test score with a minimum of 300 (combined Quantitative and Verbal) with a minimum quantitative score of 155 is strongly recommended but is not required for international students.

Microbiology Doctorate**Department Information**

- **Program Information:**
ndsu.edu/programs/graduate/microbiology/ (<http://ndsu.edu/programs/graduate/microbiology/>)

- **Department Web Site:**
ndsu.edu/microbiology/ (<http://ndsu.edu/microbiology/>)
- **Application Deadline:**
January 15 for fall
- **Credential Offered:**
Ph.D.
- **English Proficiency Requirements:**
TOEFL iBT 81 (Speaking 23, Writing 21); IELTS 7 (Speaking 6, Writing 6); Duolingo 115

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

The Ph.D. program in Microbiology encompasses many subdisciplines, including microbial ecology and evolution, virology, vaccine development, food microbiology, soil microbiology, plant-microbe and animal-microbe interactions, microbiome research, biofilm research, immunology, host-pathogen interactions, 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. Under this system, we expect that a graduating doctoral student 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 chosen 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 leadership, citizenship, and inclusiveness.

Required coursework in the typical program (five years) is 8-14 credit hours, with the remaining 76-82 credits customizable to the 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 and a qualifying exam to assess microbiological knowledge.

Code	Title	Credits
MICR 701	Introduction to Graduate Research	1-3
MICR 720	Scientific Integrity	1
MICR 790	Graduate Seminar ¹ credit per year	3-5
MICR 893	Individual Study/Tutorial (Annual Portfolio Review) ¹ credit per year	3-5
MICR 899	Doctoral Dissertation	>30

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following are required:

- Evidence of a strong academic record in the biological sciences.
- The statement of purpose should address each of the following:
 - The degree you are seeking (Comprehensive study-based M.S., Thesis-based M.S., or PhD).
 - An explanation of how obtaining a graduate degree in our program fits your career goals.
 - A description of the qualities you possess that will contribute to your success.
 - 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).
 - 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)
- The Department of Microbiological Sciences at North Dakota State University is committed to fostering a welcoming and dynamic learning environment that prepares students for academic and professional success. Graduate education benefits from a wide range of perspectives,

experiences, and problem-solving approaches. Please provide a statement describing any experiences, challenges, or perspectives that have shaped your journey and how they will contribute to your graduate studies and the broader learning community.

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 Values of the department

Please see the Microbiology website (<https://www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences/>) for more details on the admissions process and Frequently Asked Questions.

Microbiology Master's

Department Information

- **Program Information:**
[ndsu.edu/programs/graduate/microbiology/](https://www.ndsu.edu/programs/graduate/microbiology/) (<http://ndsu.edu/programs/graduate/microbiology/>)
- **Department Web Site:**
[ndsu.edu/microbiology/](https://www.ndsu.edu/microbiology/) (<http://ndsu.edu/microbiology/>)
- **Application Deadline:**
 January 15- fall
- **Credential Offered:**
 M.S.
- **English Proficiency Requirements:**
 TOEFL iBT 81 (Speaking 23, Writing 21); IELTS 7 (Speaking 6, Writing 6); Duolingo 115

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

The program seeks to help students develop their foundation of knowledge in microbiology, master techniques in microbiology and immunology, critically analyze results from their own research and the work of others, write high-quality technical documents, present their work, and to meet all professional and ethical standards of the field.

Program Options

Plan A (Thesis-based) MS degree, including an Accelerated BS to MS (4+1) Program

30 credits are required in total; 16 of which should be didactic, including required coursework in Structure & Function of Cells, Microbial Systems, and Analytical Skill & Technology. Students are expected to craft their plan of study based on their career goals and under advisement from their committee. Two credits for presentation in MICR 790 (Graduate Seminar) are required for the thesis masters. After the required courses, the remaining credits must consist of graduate-level elective coursework as featured on a Plan of Study approved by the student's thesis committee.

Plan A Outcomes

1. Adhere to ethical and professional standards in Microbiology.
2. Demonstrate foundational knowledge in Microbiology.
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 leadership, citizenship, and inclusiveness.

Plan B (Master's paper-based)

30 credits are required in total. Students must complete a minimum of 21 didactic credits towards this degree, including required coursework in Structure & Function of Cells, Microbial Systems, and Analytical Skill & Technology as required for a plan A MS degree. At least one credit for presentation in MICR 790 (Graduate Seminar) and between two and four credits in MICR 797 (MS Paper) will count towards degree requirements. Attendance at program seminars is expected as is adherence to professional standards in microbiology.

Plan B Outcomes

1. Adhere to ethical and professional standards in Microbiology.
2. Demonstrate foundational knowledge in Microbiology.
3. Participates in scholarly inquiry relevant to the field of study.
4. Critically analyze and write quality technical documents and communicate scientific content to a chosen audience.
5. Participates in collaboration to successfully complete a project.
6. Display professional skills in personal effectiveness, including managing individual projects and being ready for the workplace

Students in either Masters plan must complete the following courses

Code	Title	Credits
MICR 701	Introduction to Graduate Research	1-3
MICR 720	Scientific Integrity	1
MICR 790	Graduate Seminar ^{2 required for Thesis MS}	1-2
MICR 793	Individual Study/Tutorial ^{Masters Portfolio}	1
MICR 797	Master's Paper	2-4
or		
MICR 798	Master's Thesis	6-10

Students in either Masters plan must complete one course from each of three core areas of study:

Structure and Functional of Cells (select one of the following options):

Code	Title	Credits
MICR 675	Virology	3
MICR 680	Microbial Physiology	3
MICR 682	Microbial Genetics	3
BIOL 820	Advanced Cell Biology	3

Microbial Systems (select one of the following options):

Code	Title	Credits
MICR 652	Microbial Ecology	3
MICR 653	Food Microbiology	3
MICR 660	Microbial Pathogenesis	3
MICR 670	Basic Immunology	3

Analytical Skills & Technology (select one of the following options):

Code	Title	Credits
CSCI 732	Introduction to Bioinformatics	3
MICR 671	Immunology and Serology Laboratory	2

and

MICR 645	Animal Cell Culture Techniques	2
MICR 681	Microbial Genomics with Computational Laboratory	3
STAT 669	Introduction to Biostatistics	3

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following are required:

- Evidence of a strong academic record in the biological sciences.
- The statement of purpose should address each of the following:
 - The degree you are seeking (Comprehensive study-based M.S., Thesis-based M.S., or PhD).
 - An explanation of how obtaining a graduate degree in our program fits your career goals.
 - A description of the qualities you possess that will contribute to your success.
 - 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).
 - 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)
 - The Department of Microbiological Sciences at North Dakota State University is committed to fostering a welcoming and dynamic learning environment that prepares students for academic and professional success. Graduate education benefits from a wide range of perspectives, experiences, and problem-solving approaches. Please provide a statement describing any experiences, challenges, or perspectives that have shaped your journey and how they will contribute to your graduate studies and the broader learning community.

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 Values of the department

Please see the Microbiology website (<https://www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences/>) for more details on the admissions process and Frequently Asked Questions.

Milling, Baking & Pasta Making Certificate

Department Information

- **Program Information:**
[ndsu.edu/programs/graduate/milling-baking-pasta-making](https://www.ndsu.edu/programs/graduate/milling-baking-pasta-making) (<http://ndsu.edu/programs/graduate/milling-baking-pasta-making/>)
- **Credential Offered:**
 Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
CFS 650	Cereal Technology	3
CFS 758	Fundamentals of Flour Testing and Bakng	3
CFS 759	Milling	3
CFS 760	Pasta Processing	3
Total Credits		12

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Music Doctorate

Department Information

- **Program Information:**
nds.u.edu/programs/graduate/music (<http://nds.u.edu/programs/graduate/music/>)
- **Department Web Site:**
nds.u.edu/performingarts/music/ (<http://nds.u.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.
- **English Proficiency Requirements:**
TOEFL iBT 79, IELTS 6.5, Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

Vocal Performance

Code	Title	Credits
Music Core		30
MUSC 709	Graduate Ensemble (1,1,1,1,1,1)	
MUSC 731	Applied Study (2,2,2,2,2)	
MUSC 748	Music Bibliography/Research Methods (2)	
MUSC 780	Recital (2,2,2)	
MUSC 789	D.M.A. Thesis (1,1,1,1)	
History/Theory (course may be repeated - at least one course in each area)		15
MUSC 635	Topics in Music Theory (3)	
MUSC 636	Topics in Music History (3)	
Pedagogy/Literature/Vocal Studies		19
MUSC 642	Opera Literature (3)	
MUSC 646	Topics in Song Literature (3,3)	
MUSC 705	Graduate Diction Survey I (2)	
MUSC 706	Graduate Diction Survey II (2)	
MUSC 721	Advanced Vocal Pedagogy (3)	
MUSC 794	Practicum (3)	
Electives (In consultation with adviser)		6
Total Credits		70

Instrumental Performance

Code	Title	Credits
Music Core		38
MUSC 709	Graduate Ensemble (1,1,1,1,1,1,1,1)	
MUSC 731	Applied Study (2,2,2,2,2,2,2,2)	
MUSC 748	Music Bibliography/Research Methods (2)	
MUSC 780	Recital (2,2,2,2)	
MUSC 789	D.M.A. Thesis (1,1,1,1)	
History/Theory (course may be repeated - at least one course in each area)		15
MUSC 635	Topics in Music Theory (3)	
MUSC 636	Topics in Music History (3)	
Pedagogy/Literature (Minimum 6 credits in each area)		15
MUSC 722	Applied Instrumental Pedagogy (1-3)	
MUSC 764	Applied Instrumental Literature (1-3)	
MUSC 641	Symphonic Literature (2)	
MUSC 765	Band Literature:History and Development (3)	
MUSC 766	Band Literature:Chamber Music,Other Genres (3)	
Electives (in consultation with adviser)		6
Total Credits		74

Piano Performance

Code	Title	Credits
Music Core		34
MUSC 709	Graduate Ensemble (1,1,1,1) *	
MUSC 731	Applied Study (2,2,2,2,2,2,2,2)	
MUSC 748	Music Bibliography/Research Methods (2)	
MUSC 780	Recital (2,2,2,2)	
MUSC 789	D.M.A. Thesis (1,1,1,1)	
History/Theory (course may be repeated - at least one course in each area)		15
MUSC 635	Topics in Music Theory (3)	
MUSC 636	Topics in Music History (3)	
Pedagogy/Literature (Minimum of 3 credits in each area)		6
MUSC 623	Piano Pedagogy	
MUSC 643	Keyboard Literature	
MUSC 793	Individual Study/Tutorial (Individual Study in Keyboard Literature or Piano Pedagogy)	
Electives (in consultation with adviser)		15
Total Credits		70

* At least 3 credits of MUSC 709 must be earned while in residence at NDSU.

Collaborative Piano

Code	Title	Credits
Music Core		30
MUSC 731	Applied Study (2,2,2,2,2,2,2,2) At least 4 semesters of MUSC 731 must be taken in residence during the DMA program	
MUSC 748	Music Bibliography/Research Methods (2)	
MUSC 780	Recital (2,2,2,2)	
MUSC 789	D.M.A. Thesis (1,1,1,1)	

History/Theory (course may be repeated - at least one course in each area)		15
MUSC 635	Topics in Music Theory (3)	
MUSC 636	Topics in Music History (3)	
Piano Pedagogy; to be taken from:		3
MUSC 623	Piano Pedagogy (3)	
MUSC 793	Individual Study/Tutorial (Individual Study in Piano Pedagogy 3)	
Vocal or Instrumental Specialization		10
MUSC 642	Opera Literature (3)	
MUSC 646	Topics in Song Literature	
MUSC 705	Graduate Diction Survey I (2)	
MUSC 706	Graduate Diction Survey II (2)	
MUSC 764	Applied Instrumental Literature (3)	
Electives (in consultation with adviser)		12
Total Credits		70

Choral Conducting

Code	Title	Credits
Music Core		30
MUSC 709	Graduate Ensemble (1,1,1,1,1,1)	
MUSC 731	Applied Study (2,2,2,2,2,2)	
MUSC 733	Choral Studies and Pedagogy (Up to 4 credits (2,2) may be substituted for MUSC 731)	
MUSC 748	Music Bibliography/Research Methods (2)	
MUSC 780	Recital (2,2,2)	
MUSC 789	D.M.A. Thesis (1,1,1,1)	
History/Theory (course may be repeated - at least one course in each area)		15
MUSC 635	Topics in Music Theory (3)	
MUSC 636	Topics in Music History (3)	
Pedagogy		3
MUSC 721	Advanced Vocal Pedagogy (3)	
Literature		12
MUSC 760	Medieval/Renaissance Choral Literature (3)	
MUSC 761	Baroque Choral Literature (3)	
MUSC 762	Classical/Romantic Choral Literature (3)	
MUSC 763	Contemporary Choral Literature (3)	
Cognate Courses determined with advisor from Conducting, Music Education, Academic Studies and Performance		15
Total Credits		75

Instrumental Conducting

Code	Title	Credits
Music Core		36
MUSC 709	Graduate Ensemble (1,1,1,1,1,1)	
MUSC 731	Applied Study (2,2,2,2,2,2,2,2)	
MUSC 748	Music Bibliography/Research Methods (2)	
MUSC 780	Recital (2,2,2,2)	
MUSC 789	D.M.A. Thesis (1,1,1,1)	
History/Theory (course may be repeated - at least one course in each area)		15
MUSC 635	Topics in Music Theory (3)	
MUSC 636	Topics in Music History (3)	
Literature		6
MUSC 765	Band Literature:History and Development (3)	

MUSC 766	Band Literature:Chamber Music,Other Genres (3)	
Cognate Courses determined with advisor from Conducting, Music Education, Academic Studies and Performance		12
Electives (in consultation with adviser)		4
Total Credits		73

- All course work must be passed with a minimum grade of B.
- 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.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following is required:

- 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.

Music Master's

Department Information

- **Program Information:**
nds.edu/programs/graduate/music (<http://nds.edu/programs/graduate/music/>)
- **Department Web Site:**
nds.edu/performingarts/music/ (<http://nds.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:**
M.M.
- **English Proficiency Requirements:**
TOEFL iBT 79, IELTS 6.5, Duolingo 105

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Music Theory Pedagogy

Course List

Music Theory Core

Code	Title	Credits
Required Core Courses		
MUSC 630	Counterpoint	3
MUSC 631	Contemporary Harmonic Techniques	3
MUSC 735	Music Theory Pedagogy I	3
MUSC 736	Music Theory Pedagogy II	3
MUSC 794	Practicum	4
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.

Music Education Degree

Code	Title	Credits
Music Education Core		
MUSC 701	Psychology Of Music	3
MUSC 703	Foundations of Music Education	3
MUSC 790	Graduate Seminar	3
Music Core		
MUSC 702	Graduate Theory Survey	3
MUSC 704	Graduate Music History Survey	3
MUSC 731	Applied Study	2
Music Electives		
Choose three courses from the following options:		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

Instrumental Performance

Code	Title	Credits
Music Core		
MUSC 635	Topics in Music Theory	3
MUSC 636	Topics in Music History	3
MUSC 709	Graduate Ensemble (1,1,1,1)	4
MUSC 731	Applied Study (2,2,2,2)	8
MUSC 748	Music Bibliography/Research Methods	2
Pedagogy/Literature		
MUSC 722	Applied Instrumental Pedagogy (1-3 credits)	3
MUSC 764	Applied Instrumental Literature (1-3 credits)	3
Capstone		
MUSC 780	Recital	2

Electives - in consultation with advisor	2
Total Credits	30

Piano Performance

Code	Title	Credits
Music Core		
MUSC 635	Topics in Music Theory	3
MUSC 636	Topics in Music History	3
MUSC 709	Graduate Ensemble (1, 1)	2
MUSC 731	Applied Study (2, 2, 2, 2)	8
MUSC 748	Music Bibliography/Research Methods	2
Pedagogy/Literature		
MUSC 623	Piano Pedagogy	3
MUSC 643	Keyboard Literature	3
Capstone		
MUSC 780	Recital (2,2)	4
Electives		
In consultation with advisor		2
Total Credits		30

Collaborative Piano

Code	Title	Credits
Music Core		
MUSC 635	Topics in Music Theory	3
MUSC 636	Topics in Music History	3
MUSC 731	Applied Study (Collaborative and performance; 2-4 cr each registration)	14
MUSC 748	Music Bibliography/Research Methods	2
Vocal or instrumental specialization		
Choose two courses from the following options:		4
MUSC 705	Graduate Diction Survey I	
MUSC 706	Graduate Diction Survey II	
MUSC 709	Graduate Ensemble	
MUSC 764	Applied Instrumental Literature	
Capstone		
MUSC 780	Recital (2, 2)	4
Total Credits		30

Vocal Performance

Code	Title	Credits
Music Core		
MUSC 635	Topics in Music Theory	3
MUSC 636	Topics in Music History	3
MUSC 709	Graduate Ensemble (1,1)	2
MUSC 731	Applied Study (2,2,2,2)	8
MUSC 748	Music Bibliography/Research Methods	2
Pedagogy/Literature		

MUSC 646	Topics in Song Literature	3
MUSC 705	Graduate Diction Survey I	2
MUSC 706	Graduate Diction Survey II	2
MUSC 721	Advanced Vocal Pedagogy	3
Capstone		
MUSC 780	Recital	2
Total Credits		30

Choral Conducting

Code	Title	Credits
Music Core		
MUSC 635	Topics in Music Theory	3
MUSC 636	Topics in Music History	3
MUSC 709	Graduate Ensemble (1,1,1)	3
MUSC 721	Advanced Vocal Pedagogy	3
MUSC 731	Applied Study (2,2,2,2)	8
MUSC 748	Music Bibliography/Research Methods	2
Literature		
Choose two courses from the following options:		6
MUSC 760	Medieval/Renaissance Choral Literature	
MUSC 761	Baroque Choral Literature	
MUSC 762	Classical/Romantic Choral Literature	
MUSC 763	Contemporary Choral Literature	
Capstone		
MUSC 780	Recital	2
Total Credits		30

Instrumental Conducting

Code	Title	Credits
Music Core		
MUSC 635	Topics in Music Theory	3
MUSC 636	Topics in Music History	3
MUSC 709	Graduate Ensemble (1,1,1,1)	4
MUSC 731	Applied Study (Conducting 2,2,2,2)	8
MUSC 748	Music Bibliography/Research Methods	2
Literature		
MUSC 765	Band Literature:History and Development	3
MUSC 766	Band Literature:Chamber Music,Other Genres	3
Capstone		
MUSC 780	Recital	2
Electives		
In consultation with advisor		2
Total Credits		30

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following are required:

- 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.

Natural Resources Management Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/natural-resource-sciences (<http://ndsu.edu/programs/graduate/natural-resource-sciences/>)
- **Department Web Site:**
ndsu.edu/snrs/ (<http://ndsu.edu/snrs/>)
- **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:**
M.N.R.M.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

The M.N.R.M. program is a 30 credit, coursework only program and can be done in-person or online. 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.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (<https://catalog.ndsu.edu/graduate/admission-information/>) page.

Natural Resource Sciences Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/natural-resource-sciences (<http://ndsu.edu/programs/graduate/natural-resource-sciences/>)
- **Department Web Site:**
ndsu.edu/snrs/ (<http://ndsu.edu/snrs/>)
- **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.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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)		

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Natural Resource Sciences Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/natural-resource-sciences (<http://ndsu.edu/programs/graduate/natural-resource-sciences/>)
- **Department Web Site:**
ndsu.edu/snrs/ (<http://ndsu.edu/snrs/>)
- **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:**
M.S.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Master of Science

Plan A - Master's Thesis Option

Code	Title	Credits
Precision Agriculture Sub-plan		
ABEN 682	Instrumentation & Measurements	3
ABEN 790	Graduate Seminar	1
PAG 654	Applications of Precision Agriculture	3
Electives (must be approved by advisor and include at least 10 didactic credits)		17

PAG 798	6
Total Credits	30

Code	Title	Credits
Entomology, Natural Resource Management, Rangeland Ecology and Wildlife Management, and Soil Science Sub-plans		
Electives (must be approved by advisor and include at least 16 didactic credits)		21
Master's Thesis (ENG 798, NRM 798, RNG 798, SOIL 798)		9
Total Credits		30

Plan B - Master's Paper Option

Code	Title	Credits
Precision Agriculture Sub-plan		
ABEN 790	Graduate Seminar	1
GEOG 655	Introduction to Geographic Information Systems	3
PAG 654	Applications of Precision Agriculture	3
Electives (must be approved by advisor and include at least 10 didactic credits)		21
PAG 797		2
Total Credits		30

Code	Title	Credits
Entomology, Natural Resource Management, Rangeland Wildlife and Ecology Management, and Soil Science Sub-plans		
Emphasis Area Courses (ENT, NRM, RNG, OR SOIL)		3
Electives (must be approved by advisor and include at least 21 didactic credits)		
Master's Paper (ENT 797, NRM 797, RNG 797, or SOIL 797)		4
Total Credits		7

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

New Institutional Social Science Certificate

Department Information

- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
NISS 701	Survey of New Institutional Social Science	1
NISS 710	Workshop in New Institutional Social Science	3
ECON 762	New Institutional Economics	3
POLS 762	New Institutionalism in Political Science	3
Elective Course		
PSYC 670 or SOC 733	Experimental Social Psychology Organizations and the State	3
Total Credits		13

The Certificate Program Coordinator for the NISS certificate is Jeremy Jackson, jeremy.jackson@ndsu.edu.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

One Health Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/one-health (<http://ndsu.edu/programs/graduate/one-health/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
ANSC 675	One Health	2
PH 674 or PH 706	Epidemiology Essentials of Epidemiology	3
Choose 3 Credits of the Following		3
MICR 656	Human Microbiome	
MICR 657	Microbiomes: Agriculture and Environmental Resilience	
MICR 658	Animal Health and Antimicrobial Resistance (AMR)	
MICR 677	Vaccinology	
PH 725	Promoting Health through Policy, System and Environment	
SOIL 726	Soil Conservation for Practitioners	
Total Credits		8

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Organizational Change Management Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/organizational-change-management (<http://ndsu.edu/programs/graduate/organizational-change-management/>)
- **Department Web Site:**
ndsu.edu/business/programs/graduate/graduate_certificates/ (http://ndsu.edu/business/programs/graduate/graduate_certificates/)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Pharmaceutical Sciences Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/pharmaceutical-sciences (<http://ndsu.edu/programs/graduate/pharmaceutical-sciences/>)
- **Department Web Site:**
ndsu.edu/pharmacy (<http://ndsu.edu/pharmacy/>)
- **Application Deadline:**
March 15 for fall semester and October 1 for spring semester, if positions are available.
- **Credential Offered:**
Ph.D.
- **Test Requirement:**
GRE (300 or more)
- **English Proficiency Requirements:**
TOEFL iBT 90; IELTS 6.5; Duolingo 115

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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		
Choose 13 credits of graduate courses numbered 700-789, 791		13
Research		
Take 60 credits total from the following:		60
PSCI 790	Graduate Seminar (one credit each semester)	
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 (<http://catalog.ndsu.edu/graduate/graduate-school-policies/masters-program-policies/#planofstudytext>) Graduate College degree requirements (<https://bulletin.ndsu.edu/graduate/graduate-school-policies/masters-program-policies/>)

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following is required:

- Applicant must have adequate preparation in pharmacy or a biological or physical science related to pharmaceutical sciences.

Physics Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/physics (<http://ndsu.edu/programs/graduate/physics/>)
- **Department Web Site:**
ndsu.edu/physics/ (<http://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.
- **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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.

•

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.

Ph.D. + M.S.

- 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>).
- 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.
- After students have passed the preliminary examination, they must complete the exit survey and the Graduate School Graduation Application (<https://www.ndsu.edu/graduate-school/apply-graduation/>) in Campus Connection in order for their M.S. degree to be posted to their academic record.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Physics Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/physics (<http://ndsu.edu/programs/graduate/physics/>)
- **Department Web Site:**
ndsu.edu/physics/ (<http://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:**
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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Master of Science

Code	Title	Credits
Physics courses number 601-689 or 700-789		10
Didactic courses numbered 601-689 or 700-789		16
PHYS 790	Graduate Seminar	1
PHYS 798	Master's Thesis	6-10
Total Credits		30

Students are required to attend all seminars and colloquia.

Accelerated Master of Science

Code	Title	Credits
PHYS 790	Graduate Seminar	1
Choose from the following:		21
PHYS 611	Optics for Scientists & Engineers	
PHYS 611L	Optics for Scientists and Engineers Lab	
PHYS 613	Lasers for Scientists and Engineers	
PHYS 615	Elements of Photonics	
PHYS 662	Thermal and Statistical Physics	
PHYS 681	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.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Plant Pathology Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/plant-pathology (<http://ndsu.edu/programs/graduate/plant-pathology/>)
- **Department Web Site:**
ndsu.edu/agriculture/plant-pathology (<http://ndsu.edu/agriculture/plant-pathology/>)
- **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.
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Plant Pathology Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/plant-pathology (<http://ndsu.edu/programs/graduate/plant-pathology/>)
- **Department Web Site:**
ndsu.edu/agriculture/plant-pathology (<http://ndsu.edu/agriculture/plant-pathology/>)
- **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 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Plant Pathology Certificate

Department Information

- **Program Information:**
nds.edu/programs/graduate/plant-pathology (<http://nds.edu/programs/graduate/plant-pathology/>)
- **Department Web Site:**
nds.edu/agriculture/plant-pathology (<http://nds.edu/agriculture/plant-pathology/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
PPTH 624	Fundamental Plant Pathology	2
PPTH 635	Principles of Plant Disease Management	1
PPTH 648	Plant Disease Diagnostics and Quantification	1
PPTH 637	Practices of Plant Disease Management Research	1
Choose 3 credits of the Following		3
PPTH 645	New Science and Technology in Crop Protection	
PPTH 642	Practical Nematology	
PPTH 636	Fungicide: Basics, Resistance, and Emerging Trends	
PPTH 662	Identification and Management of Non-Soybean Oil and Legume Crop Diseases	
PPTH 663	Identification and Management of Soybean and Corn Diseases	
PPTH 664	Identification and Management of Small Grain Diseases	
PPTH 643	Greenhouse Inoculation and Phenotyping of Crop Diseases	
PPTH 647	Fundamentals of Molecular Techniques in Agriculture	
Total Credits		8

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Plant Sciences Doctorate

Department Information

- **Program Information:**
nds.u.edu/programs/graduate/plant-sciences (<http://nds.u.edu/programs/graduate/plant-sciences/>)
- **Department Web Site:**
nds.u.edu/agriculture/plant-sciences (<http://nds.u.edu/agriculture/plant-sciences/>)
- **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 be completed with the Graduate School at least 2 months prior to the start of classes.
- **Credential Offered:**
Ph.D.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following are required:

- 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

Plant Sciences Master's

Department Information

- **Program Information:**
ndsus.edu/programs/graduate/plant-sciences/ (<http://ndsus.edu/programs/graduate/plant-sciences/>)
- **Department Web Site:**
ndsus.edu/agriculture/plant-sciences/ (<http://ndsus.edu/agriculture/plant-sciences/>)
- **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 be 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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following are required:

Professional Writing Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/professional-writing (<http://ndsu.edu/programs/graduate/professional-writing/>)
- **Department Web Site:**
ndsu.edu/english/ (<http://ndsu.edu/english/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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		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 or ENGL 895		3
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.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Psychology Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/psychology (<http://ndsu.edu/programs/graduate/psychology/>)
- **Department Web Site:**
ndsu.edu/psychology (<http://ndsu.edu/psychology/>)
- **Application Deadline:**
January 15
- **Credential Offered:**
Ph.D., M.S.
- **English Proficiency Requirements:**
TOEFL iBT 79, IELTS 6.5, Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

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 or STEM 810	Introduction to College Teaching in the Humanities and Social Sciences 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

- Students 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 at NDSU.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

- Students are not admitted for the sole pursuit of a terminal master's degree.

Public Health Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/public-health (<http://ndsu.edu/programs/graduate/public-health/>)
- **Department Web Site:**
ndsu.edu/publichealth/ (<http://ndsu.edu/publichealth/>)
- **Application Deadline:**
Applications will be reviewed on a rolling basis for admission to fall, spring, or summer terms.
- **Credential Offered:**
M.P.H.
- **English Proficiency Requirements:**
See admission requirements

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

PH 774

Total Credits

18

- For PH 794 Applied Practice Experience, students cannot receive credit for past work experience.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

In addition to these requirements, the following are required:

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. 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
5. 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)

Public Health Certificate

Department Information

- **Program Information:**
ndsus.edu/programs/graduate/public-health/ (<http://ndsus.edu/programs/graduate/public-health/>)
- **Department Web Site:**
ndsus.edu/publichealth/ (<http://ndsus.edu/publichealth/>)
- **Credential Offered:**
Certificate
- **English Proficiency Requirements:**
TOEFL iBT 90; IELTS 6.5; Duolingo 115

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
General Public Health		
PH 704	Public Health Management and Policy	3
PH 706	Essentials of Epidemiology	3
PH 741	Social and Behavioral Sciences in Public Health	3
PH 745	Community Health Leadership	3
Total Credits		12
Code	Title	Credits
Management of Infectious Diseases		
PH 704	Public Health Management and Policy	3
PH 706	Essentials of Epidemiology	3
PH 735	Principles of Infectious Disease Management I	3
PH 736	Principles of Infectious Disease Management II	3
Total Credits		12
Code	Title	Credits
Maternal and Child Health		
PH 704 or PH 745	Public Health Management and Policy Community Health Leadership	3
PH 781	Foundations of Maternal and Child Health	3
PH 782	Introduction to Maternal and Child Health Epidemiology	2
PH 665 or PH 661	Women's Health Injury Prevention	2
Total Credits		10

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Public Health in Epidemiology Master's

Department Information

- **Program Information:**
nds.edu/programs/graduate/public-health (<http://nds.edu/programs/graduate/public-health/>)
- **Department Web Site:**
nds.edu/publichealth/ (<http://nds.edu/publichealth/>)
- **Application Deadline:**
Applications will be reviewed on a rolling basis for admission to fall, spring, or summer terms.
- **Credential Offered:**
M.P.H.Epi.
- **English Proficiency Requirements:**
See admission requirements

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Code	Title	Credits
Required Courses		
Foundations Courses		
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 789	Integrative Learning Experience	1
PH 794	Practicum	3
Specialization Courses		
PH 750	Epidemiologic Methods I	2
PH 752	Epidemiologic Methods II	2
PH 753	Public Health Surveillance	2
PH 754	Health Survey Research	2
Experiential Courses		
Emphasis Areas		
Select at least one emphasis areas listed below		10
Total Credits		42

Management of Infectious Diseases

Code	Title	Credits
PH 735	Principles of Infectious Disease Management I	3
PH 736	Principles of Infectious Disease Management II	3
Elective Credits		4
Total Credits		10

Maternal and Child Health

Code	Title	Credits
PH 781	Foundations of Maternal and Child Health	3
PH 782	Introduction to Maternal and Child Health Epidemiology	2
PH 785	Women's Health	2
or PH 761	Injury Prevention	
Elective Credits		3-4
Total Credits		10-11

Health Promotion

Code	Title	Credits
PH 722	Applied Community Health	3
PH 725	Promoting Health through Policy, System and Environment	3
Elective Credits		4
Total Credits		10

General Elective

Code	Title	Credits
Elective Credits		10
Total Credits		10

- For PH 794 Applied Practice Experience, students cannot receive credit for past work experience.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following are required:

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. 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
5. 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)

Public Policy Master's

Department Information

- **Program Information:**
ndsuh.edu/programs/graduate/public-policy (<http://ndsuh.edu/programs/graduate/public-policy/>)
- **Department Web Site:**
ndsuh.edu/politicalscience/ (<http://ndsuh.edu/politicalscience/>)
- **Application Deadline:**
Applications reviewed on rolling basis
- **Credential Offered:**
M.P.P.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Core Courses		24
POLS 623 or POLS 710	Public Policy Analysis 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.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

In addition to these requirements, the following are required:

- A statement of purpose answering the question: Why does the applicant wish to pursue a MPP at NDSU?
- A current resume or CV
- 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.
- 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.

Public Policy Evaluation Certificate

Department Information

- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
POLS 670 or POLS 701	Quantitative Methods for Political Science and Public Policy Quantitative Methods for Public Policy	3
POLS 702 or POLS 703	Qualitative Methods for Impact Evaluations Advanced Policy Analysis	3
POLS 705	Policy Design and Evaluation	3
Total Credits		9

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Publishing Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/publishing/ (<http://ndsu.edu/programs/graduate/publishing/>)
- **Department Web Site:**
ndsu.edu/english/ (<http://ndsu.edu/english/>)
- **Application Deadline:**
Rolling admission schedule for fall and spring semesters
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
AHSS 672	Introduction to Publishing	3
AHSS 676	Practicum in Publishing	3
AHSS 695	Field Experience	3
Total Credits		9

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following are required:

- The statement of purpose (approximately 500 words) should explain the applicant's interest in the certificate program. Applicants are encouraged to describe any relevant academic or professional experiences.

Quantitative Genetics Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/quantitative-genetics/ (<http://ndsu.edu/programs/graduate/quantitative-genetics/>)

- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
ANSC 740	Data Analyses and Designs of Experiments	3
or PLSC 724	Field Design I	
or STAT 711	Basic Computational Statistics using R	
ANSC 751	Quantitative Genetics I	3-4
or PLSC 782	Population and Quantitative Genetics	
ANSC 752	Quantitative Genetics II	3
Total Credits		9-10

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Rangeland Ecology and Management Certificate

Department Information

- **Program Information:**
nds.u.edu/programs/graduate/rangeland-ecology-management (<http://nds.u.edu/programs/graduate/rangeland-ecology-management/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
RNG 775	Rangeland Ecology and Management Certificate Capstone	1
Choose 8 Credits of the Following ¹		8
RNG 650	Range Plants	
RNG 651	Fire Ecology and Rangeland Management	
RNG 652	Managing Natural and Rangeland Resources using GIS	
RNG 653	Rangeland Resources Watershed Management	
RNG 655	Ecology and Management of Woody Plant Encroachment in Rangelands	
RNG 658	Grazing Ecology and Rangeland Management	
Total Credits		9

¹ If completing for OPM Standard all courses are required.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Rhetoric, Theory, and Culture Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/rhetoric-theory-and-culture (<http://ndsu.edu/programs/graduate/rhetoric-theory-and-culture/>)
- **Department Web Site:**
ndsu.edu/english (<http://ndsu.edu/english/>)
- **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

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

1. Code	Title	Credits
Ph.D. Core		12
ENGL 755	Composition Theory	
ENGL 756	Composition Research	
ENGL 760	Graduate Scholarship	
ENGL 762	Critical Theory	
Other research methods		3
COMM 704	Qualitative Research Methods in Communication	
COMM 767	Rhetorical Criticism	
ENGL 649	Usability and User Experience	
SOC 700	Qualitative Methods	
SOC 701	Quantitative Methods	
Pedagogy		3
ENGL 764	Teaching Workshop for Writing Instructors	
ENGL 765	Upper Division Writing: Pedagogy, Practice, and Technology	
ENGL 766	Teaching Literature	
Additional graduate-level courses ¹		21-51
Experiential learning ²		9
Dissertation Research		15
ENGL 899	Doctoral Dissertation	

¹ Students select, in consultation with their advisor, additional courses inside the English department that match their research and deepen their understanding of the field. Three additional methods, pedagogy, or theory courses may be taken from outside the English department, as approved by advisor and graduate director. Courses in this category may be at the 600-, 700-, or 800-level. Note that students with no background in English studies must include courses in literature and linguistics in their plan of study and that topics and studies courses may be repeated.

² Teaching Mentorship (0-6 credits); may be taken twice but total may not exceed 6 credits.

- Students work with faculty to read theory and co-teach 200, 300, or 400 level class. ENGL 792 Graduate Teaching Experience or ENGL 892 Graduate Teaching Experience

Internship (0-6 credits); may be taken twice but total may not exceed 6 credits.

- Students work in administrative, editing, consulting, or writing roles.

Life experience (0-3 credits).

- Students submit, in consultation with their advisor and the graduate director, a portfolio that reflects their professional experience prior to enrolling in the program.

Experiential Learning forms are found on the department website. (<https://www.ndsu.edu/english/graduate/resources/#:~:text=Experiential%20Learning%20Forms>)

Comprehensive Exams

Comprehensive exams are taken after the successful completion of 72 credits (grade B or higher) and are administered by the student's supervisory committee, which is comprised of a committee chair and two readers from within the department. The exams consist of two timed, written exams.

Dissertation: 15 credits (English 899)

The dissertation proposal precedes formal work on the dissertation. The supervisory committee is comprised of the three members of the exam committee, plus a Graduate School Representative (GSR) from outside the department.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following are required:

- In most cases, a completed Master of Arts or Science degree, 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.
- 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
- A letter stating the interest in and qualifications for a teaching assistantship.

Sociology Master's

Department Information

- **Program Information:**
ndsusocanth.edu/programs/graduate/sociology/ (<http://ndsusocanth.edu/programs/graduate/sociology/>)
- **Department Web Site:**
[ndsusocanth.edu/socanth](http://ndsusocanth.edu/) (<http://ndsusocanth.edu/>)
- **Application Deadline:**
 February 1 for fall semester
- **Credential Offered:**
 M.S.
- **English Proficiency Requirements:**
 TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Thesis (Plan A) Option

Code	Title	Credits
Required Courses		9
SOC 700	Qualitative Methods	

SOC 701	Quantitative Methods
SOC 723	Social Theory
Additional Didactic Courses (Numbered 601-689, 691; 700-789; 791 or 800-889, 891)	
Thesis Credits (SOC 798)	
Additional Coursework	
Total Credits	

7

6

8

30

Comprehensive Study (Plan B) Option

Code	Title	Credits
Required Courses		9
SOC 700	Qualitative Methods	
SOC 701	Quantitative Methods	
SOC 723	Social Theory	
Additional Didactic Courses (Numbered 601-689, 691; 700-789; 791 or 800-889, 891)		12
Research Paper Credits (SOC 797)		4
Additional Coursework		5
Total Credits		30

Culminating Experience Exam (Plan C) Option

Code	Title	Credits
Required Courses		9
SOC 700	Qualitative Methods	
SOC 701	Quantitative Methods	
SOC 723	Social Theory	
Additional Didactic Courses (Numbered 601-689, 691; 700-789; 791 or 800-889, 891)		12
Exam Preparation Credits (SOC 799)		1-3
Additional Coursework		9-11
Total Credits:		33

Additional coursework can include Field Experience (ANTH 695/795), Special Topics (SOC 696), and/or additional didactic courses in the student's area of study.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following are required:

- 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.

Master of Software Engineering

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/software-and-security-engineering (<http://ndsu.edu/programs/graduate/software-and-security-engineering/>)
- **Department Web Site:**
ndsu.edu/computer-science (<http://ndsu.edu/computer-science/>)
- **Application Deadline:**
February 1 priority deadline for fall admission; September 1 for spring admission* No summer admission for any Software Engineering Program
- **Credential Offered:**
Master of Software Engineering (M.S.E.)
- **Test Requirement:**
GRE recommended for assistantship consideration

- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following are required:

- 2 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.
- Programming skill in a modern higher level programming language, preferably C++, C#, or Java
- 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
- 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.

Software Engineering Certificate

Department Information

- **Program Information:**
nds.edu/programs/graduate/software-and-security-engineering (<http://nds.edu/programs/graduate/software-and-security-engineering/>)
- **Department Web Site:**
nds.edu/computer-science (<http://nds.edu/computer-science/>)
- **Credential Offered:**
Certificate
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page. In addition to these requirements, the following are required:

- 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
- Programming skill in a modern higher level programming language, preferably C++, C#, or Java
- 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.

Software and Security Engineering Doctorate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/software-and-security-engineering (<http://ndsu.edu/programs/graduate/software-and-security-engineering/>)
- **Department Web Site:**
ndsu.edu/computer-science (<http://ndsu.edu/computer-science/>)
- **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.
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.
- 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.

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
 - passed the comprehensive exam.
 - completed 30 credits, of which 21 credits need to be didactic credits at the graduate level at NDSU.
 - 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://www.ndsu.edu/graduate-school/apply-graduation/>) in Campus Connection 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.
- 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.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

In addition to the Graduate School admission requirements, the program has the requirements below.

- 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.
- Significant full-time professional software development experience may offset this GPA requirement at the rate of 0.1 in GPA for each 2 years of such experience to a maximum of 0.4 in GPA.
- If the applicant has an M.S. or equivalent degree from an educational institution of recognized standing, the GPA in that degree should be at least 3.35 on a 4.0 scale.
- 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.
- 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.
- Programming skill in at least 1 higher level programming language, preferably C++, C#, or Java.

Software and Security Engineering Master's

- **Program Information:**
ndsu.edu/programs/graduate/software-and-security-engineering (<http://ndsu.edu/programs/graduate/software-and-security-engineering/>)
- **Department Web Site:**
ndsu.edu/computer-science (<http://ndsu.edu/computer-science/>)
- **Application Deadline:**
February 1 priority deadline for fall admission; September 1 for spring admission* No summer admission for any Software Engineering Program
- **Credential Offered:**
Master of Science (M.S.)
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.
- A maximum of 9 credits may be transferred into the program.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

In addition to the Graduate School admission requirements, the program has the requirements below:

- 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;
- 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.
- Programming skill with one modern higher level programming language, preferably C++, C#, or Java.
- A 3.0 (on a 4.0 scale) GPA in all previous coursework.

Soil Conservation and Management Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/soil-conservation-management (<http://ndsu.edu/programs/graduate/soil-conservation-management/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
SOIL 722	Soil Testing Basics	1
SOIL 726	Soil Conservation for Practitioners	1
Choose 6 Credits of the Following		6
SOIL 610	Soils and Land Use	
SOIL 651	Digging Deeper: Understanding Soil Biology	
SOIL 723	Soil Carbon	
SOIL 724	Soil Salinity and Sodicity	
SOIL 725	Soil Reclamation	
Total Credits		8

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Sport Management Master's

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/sport-management (<http://ndsu.edu/programs/graduate/sport-management/>)
- **Department Web Site:**
ndsu.edu/hnes (<http://ndsu.edu/hnes/>)
- **Credential Offered:**
M.S.

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Required Courses		
HNES 614	Global Perspectives in Sport	3
HNES 626	Foundations of Sport Management	3
HNES 700	Research in Physical Education and Sport Coaching	3
Electives		
Choose 21 credits from the following options.		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	Current Topics in Sport Management	
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

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

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.

Statistics Doctorate

Department Information

- **Program Information:**
nds.u.edu/programs/graduate/statistics (<http://nds.u.edu/programs/graduate/statistics/>)
- **Department Web Site:**
nds.u.edu/statistics (<http://nds.u.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.
- **Test Requirement:**
 GRE (recommended)

- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

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 874. 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. 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.
4. 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.
5. 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.

*Some of these requirements may be satisfied upon admittance into the program with an already existing M.S. degree in Statistics.

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

In addition to the Graduate College requirements, the applicant must have an M.S. degree in statistics or related area. Applicants to the Statistics with and emphasis in Sports Statistics some knowledge or interest in sports.

Statistics Certificate

Department Information

- **Program Information:**
ndsus.edu/programs/graduate/statistics/ (<http://ndsus.edu/programs/graduate/statistics/>)
- **Department Web Site:**
ndsus.edu/statistics/ (<http://ndsus.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:**
Certificate
- **Test Requirement:**
TOEFL ibt 79; IELTS 6.5; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

-
- 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.
-

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Student Affairs Administration Certificate

Department Information

- Program Information:**
nds.edu/programs/graduate/student-affairs-administration (<http://nds.edu/programs/graduate/student-affairs-administration/>)
- Department Web Site:**
nds.edu/education (<http://nds.edu/education/>)
- Application Deadline:**
February 1 priority deadline, final deadline May 1
- Credential Offered:**
Certificate
- English Proficiency Requirements:**
TOEFL iBT 88, IELTS 6.5, PTE Academic 59; Duolingo 110

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

Graduate School Admission and Application Requirements are on the Admission Information (p. 73) page. In addition to the statement of purpose, a letter of support from the applicant's direct supervisor must also be included.

Supervision and Management in Physical Education and Coaching

Department Information

- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
HPER 701	Leadership and Supervision in Physical Education and Sport Coaching	3
HPER 709 or HPER 736	Laws of Leadership in Physical Education and Sport Coaching Ethical Leadership in Coaching Sports	3
HPER 712	Principles of Management in Physical Education and Coaching Settings	3
Total Credits		9

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Supply Chain Management Certificate

Department Information

- **Program Information:**
nds.u.edu/programs/graduate/supply-chain-management (<http://nds.u.edu/programs/graduate/supply-chain-management/>)
- **Department Web Site:**
nds.u.edu/business (<http://nds.u.edu/business/>)
- **Credential Offered:**
Certificate
- **English Proficiency Requirements:**
TOEFL ibt 71; IELTS 6.0; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Select 3 classes from the following:		9
TL 711	Integrated Supply Chain System	
TL 721	Global Supply Chain Management	
TL 731	Supply Chain Decision Analysis	
TL 757	Technologies for Supply Chain Transport Solutions	
TL 787	Transportation and Distribution	
Total Credits		9

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Application Deadlines

Domestic Applicants	International Applicants
July 1 - Fall	May 1 - Fall
December 1 - Spring	October 1 - Spring
April 1 - Summer	March 1 - Summer

Sustainable Agriculture and Ecosystem Services Certificate

Department Information

- **Program Information:**
nds.edu/programs/graduate/sustainable-agriculture-ecosystem-services (<http://nds.edu/programs/graduate/sustainable-agriculture-ecosystem-services/>)
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Choose 8 of the following Credits		8
MICR 654	Biotechnology for Sustainability	
MICR 655	Microbial Biotechnology	
MICR 657	Microbiomes: Agriculture and Environmental Resilience	
PLSC 620	Integrated Forage and Cover Crops Production Management and Ecosystem Services	
SOIL 610	Soils and Land Use	
SOIL 723	Soil Carbon	
SOIL 726	Soil Conservation for Practitioners	
Total Credits		8

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Transportation and Logistics Master's

Department Information

- **Program Information:**
nds.edu/programs/graduate/supply-chain-management (<http://nds.edu/programs/graduate/supply-chain-management/>)
- **Department Web Site:**
nds.edu/business (<http://nds.edu/business/>)
- **Credential Offered:**
Master of Supply Chain Management (M.S.C.M.)
- **English Proficiency Requirements:**
TOEFL ibt 71; IELTS 6.0; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

Code	Title	Credits
Core Courses		
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		
Choose five courses from the list below.		15

MGMT 727	Organizational Change Management
SCM 625	Procurement & Sourcing
SCM 653	Financing the Supply Chain
TL 715	Introduction to ERP
TL 725	ERP Configuration
TL 735	Practical Data Analytics
TL 751	Supply Chain Transport Security
TL 789	Managerial Leadership for Supply Chain Professionals

Students completing TL 715, TL 725, TL 735 elective courses are eligible to to earn an Enterprise Resource Planning (ERP) Certificate * You must submit the Add a Graduate Certificate form and the \$35 application fee to prior to the completion of these courses.

Total Credits

30

Admission and Application Requirements

Graduate School Admission and Application Requirements are on the Admission Information (p. 73) page.

Application Deadlines

Domestic Applicants	International Applicants
July 1 - Fall	May 1 - Fall
December 1 - Spring	October 1 - Spring
April 1 - Summer	March 1 - Summer

Transportation & Supply Chain Doctorate

Department Information

- **Program Information:**
ndsuh.edu/programs/graduate/transportation-supply-chain (<http://ndsuh.edu/programs/graduate/transportation-supply-chain/>)
- **Department Web Site:**
ndsuh.edu/business/programs/graduate/phd/ (<http://ndsuh.edu/business/programs/graduate/phd/>)
- **Application Deadline:**
December 1 - International applications for fall semester. Domestic applications will be reviewed as they are received.
- **Credential Offered:**
Ph.D.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6; Duolingo 105

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

Code	Title	Credits
Core Courses		
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
TL 892	Graduate Teaching Experience	2
Elective Courses		
Choose four courses from the following options.		12
TL 711	Integrated Supply Chain System	
TL 715	Introduction to ERP	

TL 721	Global Supply Chain Management	
TL 725	ERP Configuration	
TL 731	Supply Chain Decision Analysis	
TL 735	Practical Data Analytics	
TL 751	Supply Chain Transport Security	
TL 757	Technologies for Supply Chain Transport Solutions	
TL 787	Transportation and Distribution	
TL 789	Managerial Leadership for Supply Chain Professionals	
Dissertation		
TL 899	Doctoral Dissertation (minimum of 30 credits)	30
Total Credits		62

Admission and Application Requirements

Graduate School admission and application requirements are found on the Admission Information (p. 73) page.

Women and Gender Studies Certificate

Department Information

- **Program Information:**
nds.edu/programs/graduate/women-and-gender-studies (<http://nds.edu/programs/graduate/women-and-gender-studies/>)
- **Department Web Site:**
nds.edu/wgs (<http://nds.edu/wgs/>)
- **Application Deadline:**
Rolling admission schedule
- **Credential Offered:**
Certificate

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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

Admission and Application Requirements

Graduate School Admission and Application Requirements are found on the Admission Information (p. 73) page. In addition to those requirements, your application must also include:

- A statement of purpose (no more than two double-spaced pages) which must indicate 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.

Youth Development Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/youth-development (<http://ndsu.edu/programs/graduate/youth-development/>)
- **Department Web Site:**
ndsu.edu/hdfs (<http://ndsu.edu/hdfs/>)
- **Application Deadline:**
One month prior to the beginning of each term. Applications accepted for fall, spring, and summer.
- **Credential Offered:**
Certificate
- **English Proficiency Requirements:**
TOEFL iBT 100 (subscores of at least 24 for speaking and 21 for writing); IELTS 7 ; Duolingo 125

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal__PB)

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.

Admission and Application Requirements

Graduate School Admission and Application Requirements are on the Admission Information (p. 73) page.

Youth Program Management and Evaluation Certificate

Department Information

- **Program Information:**
ndsu.edu/programs/graduate/youth-development (<http://ndsu.edu/programs/graduate/youth-development/>)
- **Department Web Site:**
ndsu.edu/hdfs (<http://ndsu.edu/hdfs/>)
- **Application Deadline:**
One month prior to the beginning of each term. Applications accepted for fall, spring, and summer.
- **Credential Offered:**
Certificate
- **Test Requirement:**
TOEFL iBT 100 (subscores of at least 24 for speaking and 21 for writing); IELTS 7 ; Duolingo 125

Apply Now (https://ndsugrad.my.site.com/Application/TX_SiteLogin/?startURL=/Application/TargetX_Portal_PB)

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.

Admission and Application Requirements

Graduate School Admission and Application Requirements are on the Admission Information (p. 73) page. In addition to these requirements, the following must be submitted.

- 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:
 - How your interest in this field developed.
 - Why you chose our program at NDSU.
 - The experiences you have had (e.g. informal, academic, employment, volunteer) that you see as related to this graduate program or your professional goals.
 - What your professional goals are and how this graduate program will help you accomplish your professional goals.

Undergraduate Curricula

A (p. 296) B (p. 297) C (p. 297) D (p. 298) E (p. 298) F (p. 299) G (p. 299) H (p. 300) I (p. 300) J (p. 300) K L (p. 300)
M (p. 300) N (p. 301) O (p. 302) P (p. 302) Q R (p. 303) S (p. 303) T (p. 304) U (p. 304) V (p. 304) W (p. 304) X Y Z
(p. 304)

A=Accelerated; DD=Dual Degree; O=Online; 2=Second Major Only

A

- **Accounting**
 - Major (p. 304)
 - Minor (p. 306)
- **Advertising and Design**
 - Certificate (p. 307)
- **Aerospace Studies**
 - Minor (p. 308)
- **Aging Studies**
 - Certificate (p. 308)^O
- **Agribusiness**
 - Major (p. 308)^A
 - Minor (p. 311)
- **Agricultural and Biosystems Engineering**
 - Major (p. 311)^A
- **Agricultural Communication**
 - Major (p. 314)
 - Minor (p. 315)
- **Agricultural Economics**
 - Major (p. 316)^A
- **Agricultural Education**
 - Major (p. 317)
- **Agricultural Sciences**
 - Major (p. 319)^O
- **Agricultural Technology**
 - Major (p. 324)
- **Animal Science**
 - Major (p. 327)^A
 - Minor (p. 330)
- **Anthropology**
 - Major (p. 330)
 - Minor (p. 331)
- **Apparel, Retail Merchandising and Design**
 - Major (p. 332)
 - Minor (p. 334)
 - Certificate (p. 335)
- **Applied AI for All Careers**
 - Certificate (p. 335)^O
- **Architecture**
 - Major (p. 335)
- **Art**
 - Major (p. 337) - BA/BS
 - Major (p. 338) - BFA
 - Minor (p. 340)
- **Art Education**
 - Major (p. 340)

- **Artificial Intelligence**
 - Minor (p. 342)^O

B

- **Banking**
 - Minor (p. 343)
- **Behavioral Statistics**
 - Major (p. 343)
- **Biochemistry**
 - Minor (p. 346)
- **Biochemistry and Molecular Biology**
 - Major (p. 345)^A
- **Biological Sciences**
 - Major (p. 347)^A
 - Minor (p. 351)
- **Biological Sciences Education**
 - Major (p. 352)
- **Biomedical Engineering**
 - Minor (p. 354)
- **Biotechnology**
 - Major (p. 354)^A
 - Minor (p. 357)
- **Botany**
 - Minor (p. 357)
- **Business Administration**
 - Major (p. 358)^O
 - Minor (p. 360)^O
- **Business Analytics**
 - Certificate (p. 361)
- **Business Education**
 - Major (p. 361)

C

- **Chemistry**
 - Major (p. 363)^A
 - Minor (p. 366)
- **Chemistry Education**
 - Major (p. 367)
- **Civil Engineering**
 - Major (p. 369)^A
- **Coatings and Polymeric Materials**
 - Minor (p. 371)^A
- **Community Development**
 - Minor (p. 372)
- **Comprehensive Science Education**
 - Major (p. 373)
- **Computer Engineering**
 - Major (p. 377)^O
- **Computer Science**
 - Major (p. 382) - B.A. (p. 382)^A
 - Major (p. 384) - B.S. (p. 384)^A
 - Minor (p. 386)
 - Certificate (p. 387)^O
- **Computer Science and Mathematics**
 - Dual Major (p. 379)
- **Computer Science and Physics**

- Dual Major (p. 381)
- **Computer Science Foundations**
 - Certificate (p. 382)^O
- **Computing Systems**
 - Certificate (p. 387)^O
- **Construction Engineering**
 - Major (p. 387)^A
- **Construction Management**
 - Major (p. 389)^A
- **Core Computer Science Competencies**
 - Certificate (p. 391)^O
- **Creative Writing**
 - Minor (p. 391)
- **Criminal Justice**
 - Major (p. 392)^A
 - Minor (p. 393)
- **Crop and Weed Science**
 - Major (p. 393)^A
 - Minor (p. 396)
- **Cultural Diversity**
 - Minor (p. 397)
- **Cybersecurity**
 - Major (p. 397)^O
 - Minor (p. 399)^O
 - Certificate (p. 399)^O

D

- **Data Science**
 - Major (p. 399)^O
 - Certificate (p. 401)^O
- **Disaster Resilience and Emergency Management**
 - Major (p. 402)^{A, O}
 - Minor (p. 403)^O

E

- **Economic Computation**
 - Certificate (p. 404)
- **Economics**
 - Major (p. 404)^A
 - Minor (p. 408)
- **Electrical Engineering**
 - Major (p. 408)^{A, O}
- **Electrical Engineering & Physics**
 - Dual Major (p. 411)
- **Elementary Education & Human Development and Family Science** (Dual degree with Valley City State University)
 - Major (p. 413)^{DD}
- **Energy Engineering**
 - Minor (p. 415)
- **Energy Engineering Buildings**
 - Certificate (p. 416)
- **Energy Engineering Generation**
 - Certificate (p. 416)
- **Energy Engineering Vehicles**
 - Certificate (p. 417)
- **English**

- Major (p. 417)
- Minor (p. 419)
- **English Education**
 - Major (p. 421)
- **Entrepreneurship**
 - Minor (p. 423)^O
 - Certificate (p. 424)^O
- **Environmental Engineering**
 - Major (p. 424)
- **Equine Assisted Services**
 - Minor (p. 426)
- **Equine Science**
 - Major (p. 427)
 - Minor (p. 429)
- **Event Management**
 - Certificate (p. 430)^O
- **Exercise Science**
 - Major (p. 430)^A
- **Extension Education**
 - Minor (p. 432)

F

- **Family and Consumer Sciences Education**
 - Major (p. 432)
- **Family Financial Planning**
 - Certificate (p. 434)^O
- **Finance**
 - Major (p. 434)
 - Certificate (p. 436)
- **Food Safety**
 - Certificate (p. 437)^O
- **Food Science**
 - Major (p. 437)^A
- **Food Science and Technology**
 - Minor (p. 439)
- **Forensic Science**
 - Minor (p. 439)
- **Foundations of Mental Health Care**
 - Certificate (p. 440)^O
- **Fraud Investigation**
 - Minor (p. 440)
- **Fundamentals of Computing & Security**
 - Certificate (p. 441)^O

G

- **General Agriculture**
 - Minor (p. 441)
- **Geographic Information Systems**
 - Certificate (p. 441)^O
- **Gerontology**
 - Minor (p. 442)
- **Global Business**
 - Major (p. 442)²
- **Global Studies**

- Major (p. 443)
- Minor (p. 446)
- Certificate (p. 448)
- **Graphic Design**
 - Major (p. 449) - BFA
 - Minor (p. 450)

H

- **Health Education**
 - Major (p. 451)
- **Health Services**
 - Major (p. 452) ^A
- **History**
 - Major (p. 454)
 - Minor (p. 456)
- **Horticulture**
 - Minor (p. 456)
- **Horticulture and Urban Agriculture**
 - Major (p. 457) ^A
- **Hospitality & Tourism Management**
 - Minor (p. 461) ^O
- **Human Development and Family Science**
 - Major (p. 462) ^{A, O}
 - Minor (p. 464) ^O
- **Human Factor in Artificial Intelligence**
 - Certificate (p. 464) ^O

I

- **Industrial Engineering and Management**
 - Major (p. 464) ^A
 - Minor (p. 467)
- **Information Technology**
 - Major (p. 467) ^O
- **Interior Design**
 - Major (p. 469)

J

- **Journalism**
 - Major (p. 471)
 - Minor (p. 472)

L

- **Landscape Architecture**
 - Major (p. 472)
 - Minor (p. 474)
- **Large Animal Veterinary Technology**
 - Minor (p. 474)

M

- **Management**
 - Major (p. 475) ^O
- **Management Communication**
 - Major (p. 478)
 - Minor (p. 479)
- **Management Information Systems**

- Major (p. 480)
- Minor (p. 483)
- **Manufacturing Engineering**
 - Major (p. 483)
 - Minor (p. 485)
- **Marketing**
 - Major (p. 486) ^O
- **Mathematics**
 - Major (p. 493) ^A
 - Minor (p. 494)
- **Mathematics Education**
 - Major (p. 495)
- **Mathematics and Computer Science**
 - Dual Major (p. 379)
- **Mathematics and Physics**
 - Dual Major (p. 488)
- **Mathematics and Statistics**
 - Dual Major (p. 490)
- **Mathematics and Statistics Pre-Actuarial**
 - Dual Major (p. 491)
- **Meat Science**
 - Certificate (p. 496)
- **Mechanical Engineering**
 - Major (p. 497) ^A
- **Mechanical Engineering and Physics**
 - Dual Major (p. 499)
- **Medical Laboratory Science**
 - Major (p. 501)
- **Microbiology**
 - Major (p. 503) ^A
 - Minor (p. 506)
- **Military Science**
 - Minor (p. 507)
- **Music**
 - Major (p. 507) - BS
 - Music - Composition (p. 510) - BMus
 - Music - Instrumental Performance (p. 513) - BMus
 - Music - Piano Performance (p. 516) - BMus
 - Music - Vocal Performance (p. 518) - BMus
 - Minor (p. 510)
- **Music Education**
 - Music - Instrumental Education (p. 520) - BMus
 - Music - Vocal Education (p. 522) - BMus
 - Minor (p. 524)
 - Minor - Instrumental Music Education (p. 525)
 - Minor - Vocal Music Education (p. 525)

N

- **Natural Resources Management**
 - Major (p. 526) ^A
 - Minor (p. 532)
- **Neuroscience**
 - Minor (p. 533)
- **Nursing**

- Major - Pre-Licensure (p. 533)
- Major - LPN to BSN (p. 535) ^O
- Major - RN to BSN (p. 537) ^O
- Major - Post-Baccalaureate BSN (p. 538)
- **Nutrition Science**
 - Major (p. 539) ^A

O

- **Organizational Leadership**
 - Certificate (p. 541)

P

- **Pharmaceutical Sciences**
 - Major (p. 541) (includes the Pre-Pharmacy requirements)
 - Minor (p. 543)
- **Pharmacy**
 - Major (p. 543)
- **Philosophy, Ethics, and Applied Humanities**
 - Major (p. 545)
 - Minor (p. 546)
- **Physical Education**
 - Major (p. 547)
- **Physics**
 - Major (p. 550) ^A
 - Minor (p. 552)
- **Physics Education**
 - Major (p. 552)
- **Physics and Computer Science**
 - Dual Major (p. 381)
- **Physics and Mathematics**
 - Dual Major (p. 488)
- **Political Science**
 - Major (p. 554) ^A
 - Minor (p. 556)
- **Precision Agriculture**
 - Minor (p. 556)
- **Pre-Law**
 - Minor (p. 557)
- **Private Enterprise**
 - Certificate (p. 558)
- **Professional Ethics**
 - Minor (p. 558)
 - Certificate (p. 559)
- **Professional Selling**
 - Minor (p. 559)
 - Certificate (p. 560)
- **Professional Writing**
 - Certificate (p. 560)
- **Psychology**
 - Major (p. 561) ^A
 - Minor (p. 564) ^O
- **Public Health**
 - Minor (p. 564)
- **Public History**
 - Major (p. 564)

- **Public Policy**
 - Minor (p. 566)
- **Publishing**
 - Certificate (p. 567)

R

- **Radiologic Sciences**
 - Major (p. 567)
- **Range Science**
 - Minor (p. 569)
- **Real Estate Valuation**
 - Minor (p. 569)
- **Religion**
 - Minor (p. 570)
- **Respiratory Care**
 - Major (p. 570)
- **Robotics**
 - Minor (p. 572)

S

- **Social Studies Education**
 - Major (p. 573)
- **Social Work & Human Development and Family Science** (Dual degree with Minot State University)
 - Major (p. 576) ^{DD}
- **Sociology**
 - Major (p. 578)
 - Minor (p. 579)
- **Software Development**
 - Certificate (p. 580) ^O
- **Software Engineering**
 - Major (p. 580) ^O
 - Certificate (p. 582) ^O
- **Soil Science**
 - Minor (p. 582)
- **Spanish**
 - Major (p. 582)
 - Minor (p. 584)
 - Certificate of Completion - First-Year Spanish (p. 363)
 - Certificate of Completion - Second-Year Spanish (p. 363)
 - Certificate of Completion - Third-Year Spanish (p. 363)
- **Spanish Education**
 - Major (p. 585)
- **Spanish Studies**
 - Minor (p. 584)
- **Sport Coaching**
 - Certificate (p. 587)
- **Sport Management**
 - Major (p. 587) ^A
- **Statistics**
 - Major (p. 588)
 - Minor (p. 590)
- **Statistics and Mathematics**
 - Dual Major (p. 490)
- **Strategic Communication**

- Major (p. 590)
- Minor (p. 592)
- **Supply Chain Management**
 - Major (p. 592)
 - Minor (p. 594)

T

- **Theatre Arts**
 - Major (p. 594)-BA/BS
 - Major - Design and Tech Theatre (p. 597) - BFA
 - Major - Musical Theatre (p. 598) - BFA
 - Major - Performance (p. 600) - BFA
 - Minor (p. 601)
- **Tribal and Indigenous Peoples Studies**
 - Minor (p. 602)

U

- **University Studies**
 - Major (p. 603) ⁰

V

- **Veterinary Technology**
 - Major (p. 604)

W

- **Water Resources**
 - Certificate (p. 605)
- **Wellness**
 - Minor (p. 606)
- **Women and Gender Studies**
 - Major (p. 607)
 - Minor (p. 608)

Z

- **Zoology**
 - Minor (p. 609)

Accounting Major

Major Requirements

Degree Type: B.S.

Minimum Required Credits: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).

6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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
MGMT 470	Entrepreneurship/Small Business Management
GLBL 492	Global Practicum: Study Abroad

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 courses¹ required for degree completion, with a minimum grade of C². All transfer courses are subject to approval by the course discipline chair or designated representative.
 - ¹Defined as courses with the following prefixes: ACCT, BUSN, ENTR, FIN, MGMT, MIS, MRKT, SCM
 - ²Credits 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.

Accounting Minor**Minor Requirements**

Minimum Required Credits: 19

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.

- 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

Certificate Requirements

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 Minor

Minor Requirements

Minimum Credits Required: 16

Code	Title	Credits
Required General Military Courses (Year 1-2)		
AS 111	Heritage and Values I Fall	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 Certificate

Certificate Requirements

Minimum Credits Required: 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 Major

Degree Requirements

Degree Type: B.S.

Minimum Degree Credits: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	3
ECON 202	Principles of Macroeconomics	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		
ECON 189	Skills for Academic Success ¹	1
TL 116	Business Software Applications	3
Communication Requirement: Select one of the following:		3
COMM 212	Interpersonal Communication	
COMM 216	Intercultural Communication	
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	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 **87-98**

Areas of Specialization: Select one

Code	Title	Credits
Finance		
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		
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		
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 & AGECE 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 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.

Degree Requirements and Notes

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

Agribusiness Minor

Minor Requirements

Minor: Agribusiness

Required Credits: 18

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: Select a minimum of 9 credits from the following:		9
ECON 341	Intermediate Microeconomics	
AGEC	Any AGECE prefix courses numbered 242 or higher (excluding AGECE 397 and AGECE 496)	
Total Credits		18

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

Agricultural and Biosystems Engineering Major

Degree Requirements

Major: Agricultural and Biosystems Engineering

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

Minimum Required Credits: 128

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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

Category L: Digital Literacy

Total Credits**39**

Major Requirements

ABEN Core Requirements

Code	Title	Credits
Core Requirements		
ABEN 110	Introduction to Agricultural and Biosystems Engineering	3
ABEN 255	Computer Aided Analysis & Design	3
ABEN 263	Biological Materials Processing	3
ABEN 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	3
ABEN 487	Design Project II	3
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 13 credits from the following: (At least 3 of the 13 credits must be selected from the courses with a 3 footnote.) 13

ABEN 286	Introduction to Controlled Environment Agriculture (Natural Resource/General Focus)
ABEN 377	Finite Element Analysis 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 (Machinery 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 13 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 Major

Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

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	
DREM 101	Emergencies, Disasters, and Catastrophes	
Minor Requirement:		
Students are required to minor in Animal Science, Crop and Weed Science, Equine Science, Food Safety, Natural Resource Management, Range Science, or Soil Science.		16
Total Credits		77

Minor Notes:

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

Agricultural Communication Minor

Minor Requirements

Required Credits: 21

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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Core Courses for Agricultural Economics		
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
AGEC 246	Introduction to Agricultural Finance	3
AGEC 339	Quantitative Methods & Decision Making	3
AGEC 375	Applied Agricultural Law	3
or AGECE 484	Agricultural Policy	
Select one 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	
ECON 189	Skills for Academic Success	1
ECON 201	Principles of Microeconomics	3

ECON 202	Principles of Macroeconomics	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 or ECON 410	Regression Analysis Econometrics	2-3
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	
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 AGECE or ECON electives		
Agriculture Science & Technology: ²		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		70-74

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 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 Major

Major Requirements

Degree Type: B.S.

Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Agriculture Education Core Requirements		
AGEC 242	Introduction to Agricultural Management	3
AGEC 244 or AGEC 350	Agricultural Marketing Agrisales	3
ANSC 114	Introduction to Animal Sciences	3
ANSC 223	Introduction to Animal Nutrition	3
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		83-96

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	Advising FFA and SAE	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	Advising FFA and SAE	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: AGECE, AGRI, ANSC, ASM, NRM, PLSC, PAG, SOIL, VETS		15-18
Total Credits		46-49

Degree Requirements and Notes

- See the Agricultural Education website 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 Major

Requirements

Degree Type: B.S.

Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.

3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Major Requirements for Agriculture Sciences		
AGRI 189	Skills for Academic Success	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 or BIOL 150	Concepts of Biology General Biology I	3
CSCI 114 or TL 116	Computer Applications Business Software Applications	3
CHEM 117 or CHEM 121	Chemical Concepts and Applications General Chemistry I	3
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	3
Select 6 credits from the following:		6
ANSC 260	Introduction to Equine Studies	
ANSC 300	Domestic Animal Behavior and Management	
ANSC 324	Applied Animal Nutrition	
ANSC 357	Animal Genetics	
ANSC 370	Fundamentals/Animal Disease	
ANSC 371	Fundamentals of Animal Disease II	
Total Credits		13

Code	Title	Credits
Animal Production Emphasis Area		
ANSC 220	Livestock Production	3
ANSC 223	Introduction to Animal Nutrition	3
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 324	Applied Animal Nutrition	
ANSC 340	Principles of Meat Science	
ANSC 344	Fundamentals of Meat Processing	
ANSC 380	Livestock Sales and Marketing	
ANSC 463	Physiology of Reproduction	
ANSC 487	Growing and Finishing Cattle Management	

PLSC 315	Genetics	
Total Credits		13
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		
ENT 350	General Entomology	3
PLSC 215	Weed Identification	1
PLSC 323	Principles of Weed Science	3
PLSC 453	Advanced Weed Science	2
Total Credits		9
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.

Agricultural Technology Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Agricultural Technology 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	3
PLSC 110	World Food Crops	3
or ANSC 114	Introduction to Animal Sciences	
ANSC 218	Anatomy and Physiology of Domestic Animals	3
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**50****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 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
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
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

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.

Animal Science Major

Requirements

Degree Type: B.S.

Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Required Core Courses for Animal Science		
ANSC 101	Student Success Techniques - Animal and Equine Science	1
or ANSC 102	Student Success Techniques - Animal Sciences with Pre-Veterinary Medicine Emphasis	

or VETS 101	Student Success Techniques: Veterinary Technology	
ANSC 114	Introduction to Animal Sciences	3
ANSC 115	Introduction to Livestock Health Management and Welfare	3
ANSC 130	Foundations of Livestock and Product Evaluation	2
or ANSC 235	Equine Evaluation	
ANSC 218	Anatomy and Physiology of Domestic Animals	3
ANSC 220	Livestock Production	3
ANSC 223	Introduction to Animal Nutrition	3
ANSC 240	Meat Animal Evaluation and Marketing	3
ANSC 300	Domestic Animal Behavior and Management	3
ANSC 324	Applied Animal Nutrition	3
ANSC 357	Animal Genetics	3
ANSC 463 & 463L	Physiology of Reproduction and Physiology of Reproduction Laboratory	4
ANSC 379	Global Seminar	2
or ANSC 393	Undergraduate Research	
or ANSC 396	Field Experience	
ANSC 478	Research and Issues in Animal Agriculture	3
ANSC 480	Equine Industry and Production Systems	3
or ANSC 482	Sheep Industry and Production Systems	
or ANSC 484	Swine Production/Pork Industry Systems	
or ANSC 486	Beef Industry and Production Systems	
or ANSC 488	Dairy Industry and Production Systems	
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
ECON 201	Principles of Microeconomics	3
MATH 103	College Algebra	3
or MATH 105	Trigonometry	
or MATH 107	Precalculus	
or MATH 146	Applied Calculus I	
STAT 330	Introductory Statistics	3

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 Option One must officially declare that option with the Office of Registration and Records.

Total Credits **90-95**

Option 1: Animal Production, Management, & Husbandry Option (Standard)

Code	Title	Credits
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab	4
ANSC 340	Principles of Meat Science	3
ANSC 370	Fundamentals/Animal Disease	3
ANSC 380	Livestock Sales and Marketing	2
Select one of the following (must be different from major requirements):		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	
Animal Production, Management, and Husbandry Elective (choose from any level ANSC, NRM, RNG, PLSC, or SOIL)		6
Total Credits		30

Option 2: 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 370	Fundamentals/Animal Disease	3
ANSC 444	Livestock Muscle Physiology	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
CHEM 240 or CHEM 341	Survey of Organic Chemistry Organic Chemistry I	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
Select one lecture/lab from the following: ²		4
PHYS 120 & 120L	Fundamentals of Physics and Fundamentals of Physics Laboratory	
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	
PLSC 315	Genetics	3
Biomedical Science Elective (choose from 300+ level ANSC, BIOG, BIOL, CHEM, MICR, or VETS)		3
Total Credits		32

Option 3: Animal Agribusiness Option

Code	Title	Credits
ACCT 102	Fundamentals of Accounting	3
AGEC 242	Introduction to Agricultural Management	3
AGEC 244 or AGECE 246	Agricultural Marketing Introduction to Agricultural Finance	3
AGEC 342	Farm and Agribusiness Management II	3
AGEC 420	Integrated Farm and Ranch Management	3
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab	4
ANSC 380	Livestock Sales and Marketing	2
Animal Agribusiness Electives (choose from any level ANSC, AGECE, ECON, NRM, RNG, PLSC or SOIL)		6
Total Credits		27

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.

² Veterinary Schools generally require CHEM 341 and PHYS 211 and their respective lab, at a minimum. Be sure to consult an academic advisor based on veterinary schools you plan to apply to for additional pre-requisites needed.

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

Animal Science Minor

Minor Requirements

Minimum Credits Required: 16

Code	Title	Credits
Required Courses		
ANSC 114	Introduction to Animal Sciences	3
ANSC 223	Introduction to Animal Nutrition	3
ANSC 220	Livestock Production	3
ANSC 240	Meat Animal Evaluation and Marketing	3
Elective Courses		4
ANSC 115	Introduction to Livestock Health Management and Welfare	
ANSC 130	Foundations of Livestock and Product Evaluation	
ANSC 218	Anatomy and Physiology of Domestic Animals	
ANSC 230	Meat Grading and Evaluation	
ANSC 231	Livestock Evaluation	
ANSC 232	Dairy Cattle Evaluation	
ANSC 300	Domestic Animal Behavior and Management	
ANSC 324	Applied Animal Nutrition	
ANSC 340	Principles of Meat Science	
ANSC 357	Animal Genetics	
ANSC 370	Fundamentals/Animal Disease	
ANSC 380	Livestock Sales and Marketing	
ANSC 444	Livestock Muscle Physiology	
ANSC 463	Physiology of Reproduction	
ANSC 463L	Physiology of Reproduction Laboratory	
ANSC 487	Growing and Finishing Cattle Management	
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.

Anthropology Major

Major Requirements

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

Minimum Credits Required: 12

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.

3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	Professional Seminar	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.

Anthropology Minor

Minor Requirements

Minimum Credits Requirements: 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 ANTH 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.

Apparel, Retail Merchandising and Design Major

Major Requirements

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

Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	15 or 27

Total Credits	75-90

Retail Merchandising Option

Code	Title	Credits
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 ¹		
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

Fashion Product Development Option

Code	Title	Credits
ARMD 101	Beginning Apparel Construction	3
ARMD 155	Apparel Construction and Fit	3
ARMD 455	Apparel Design and Assembly	3
ART 124	Foundations of Design	3
ART 131	Foundations Drawing	3
Total Credits		15

Fashion Entrepreneurship Option

Code	Title	Credits
MRKT 372	Global Retailing	3
Entrepreneurship minor is required. ¹		
ENTR 201	Introduction to Entrepreneurship	3
ENTR 401	Entrepreneurship Capstone	3
ENTR 301	Entrepreneurship Toolbox I	3
or ENTR 440	International Entrepreneurship	
Select one from the following:		3
MRKT 465	Digital Marketing	
MGMT 451	Negotiations	
ENTR 301	Entrepreneurship Toolbox I (If not taken above)	
ENTR 440	International Entrepreneurship (If not taken above)	
Total Credits		15

¹ Minors must be officially declared through the Office of Registration and Records. Minors are a minimum of 16 credit hours and may have a GPA restrictions. See the official minor curriculum.

Degree Requirements and Notes

- Transfer courses from other institutions must have grades of 'C' or better to be accepted for the program.

Apparel, Retail Merchandising and Design Minor

Minor Requirements

Minimum 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.

Apparel, Retail Merchandising and Design Certificate

Certificate Requirements

Minimum 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

Applied AI for All Careers Certificate

Certificate Requirements

Minimum Credits Required: 10

Code	Title	Credits
CSCI 121	Artificial Intelligence for Everyone	3
CSCI 170	Social Impacts of Artificial Intelligence	3
CSCI 394	Individual Study	1
COMM 112	Understanding Media and Social Change	3
Total Credits		10

Architecture Major

Major Requirements

Degree Type: B.S.Arch.
Minimum Credits Required: 138

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		

Total Credits		39

Code	Title	Credits
Architecture Requirements		
ANTH 111	Introduction to Anthropology	3
ARCH 231	Creativity and Communication	3
ARCH 232	Design Technology	3
ARCH 271	Architectural Design I	6
ARCH 272	Architectural Design II	6
ARCH 321	History and Theory of Architecture I	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 444	Advanced Systems and Environment	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	6
or ARCH 474	International Design Studio	
ARCH 472	Architectural Design VI (Capstone)	6
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	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	3
PSYC 111	Introduction to Psychology	3
SOC 110	Introduction to Sociology	3
PHIL Elective		3
Total Credits		104

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 Major (B.A. or B.S.)

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
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
ART 335	Figure Drawing	3
Intro Studio Core		
Choose six (6) classes from the list below:		18
ART 120	Painting I	
ART 150	Ceramics I	
ART 160	Sculpture I	
ART 170	Printmaking I	
ART 180	Photography I	
ART 185	Graphic Design I	
ARMD 101	Beginning Apparel Construction	
Advanced Studio Development and Practice Core		
Students will take two Topics in Studio courses with a 1 credit Studio Practice Seminar course. Courses can be repeated.		
Choose two (2) Topics in Studio classes from the list below:		6
ART 320	Topics in Painting	
ART 350	Topics in Ceramics	
ART 380	Topics in Photography	
ART 390	Advanced Studio Arts Development	
Students must enroll in a section of ART 491 concurrently with their Topics in Studio courses.		
ART 491	Seminar	1
ART 491	Seminar	1
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 (choose one from the list below)		3
ART 420	Baccalaureate Studio: Painting	
ART 450	Baccalaureate Studio: Ceramics	
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.

Art Major (B.F.A.)

Major Requirements

Degree Type: B.F.A. Art

Minimum Credits Required:**University Degree Requirements**

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
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
ART 335	Figure Drawing	3
Intro Studio Core		
Choose six (6) classes from the list below:		18
ART 120	Painting I	
ART 150	Ceramics I	
ART 160	Sculpture I	
ART 170	Printmaking I	
ART 180	Photography I	
ART 185	Graphic Design I	
ARMD 101	Beginning Apparel Construction	
Advanced Studio Development and Professional Practice Core		

Students will take four (4) sections of Topics in Studio over four semesters. Topics in Studio courses can be repeated for credit, and students can take any combination of Topics Studios, as long as they have taken the complementary Intro Studio course.

Choose four (4) classes from the list below: 12

ART 320	Topics in Painting	
ART 350	Topics in Ceramics	
ART 380	Topics in Photography	
ART 390	Advanced Studio Arts Development	

In conjunction with the Topics in Studio courses, students will take two (2) sections of ART 391 Seminar and two (2) sections of ART 491 Seminar, one each semester for four semesters.

ART 391	Seminar	1
ART 391	Seminar	1
ART 491	Seminar	1
ART 491	Seminar	1

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	3
ART 489	Baccalaureate Project	3
Baccalaureate Studio (Select a studio to be repeated twice over two semesters)		6
ART 420	Baccalaureate Studio: Painting	
ART 450	Baccalaureate Studio: Ceramics	
ART 480	Baccalaureate Studio: Photography	
ART 485	Baccalaureate Studio: Graphic Design	
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.

Art Minor

Minor Requirements

Minimum Degree Required: 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

- The department must submit a substitution/waiver form identifying the courses that will make up the 18 credits for this minor and submit to the Office of Registration and Records.
- 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 Major

Major Requirements

Degree Type: B.S.

Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 & 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 451	History of American Art	3
or ART 453	Topics in Art History	
ART 452	Contemporary Art	3
Studies in Foundations and Intro Studios		
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 will take two Topics in Studio courses with a 1 credit Studio Practice Seminar course. Courses can be repeated.

Choose two (2) Topics in Studio classes from the list below: 6

ART 320	Topics in Painting	
ART 350	Topics in Ceramics	
ART 380	Topics in Photography	
ART 390	Advanced Studio Arts Development	

Students must enroll in a section of ART 491 concurrently with their Topics in Studio courses.

ART 491	Seminar	1
ART 491	Seminar	1

Baccalaureate Capstone Project

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.

ART 489	Baccalaureate Project	3

Choose a Baccalaureate Studio from the following list: 3

ART 420	Baccalaureate Studio: Painting	
ART 450	Baccalaureate Studio: Ceramics	
ART 480	Baccalaureate Studio: Photography	
ART 485	Baccalaureate Studio: Graphic Design	

Total Credits 93

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 Minor

Minor Requirements

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 or MATH 270	Discrete Mathematics Introduction to Abstract Mathematics	3
CSCI 372 or CSCI 312	Comparative Programming Languages Survey of Programming Languages	3
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	Artificial Intelligence for Robots and 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 Minor

Minor Requirements

Minimum Required Credits: 18

Code	Title	Credits
ECON 105 or ECON 201	Elements of Economics Principles of Microeconomics	3
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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credit Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Behavioral Statistics Core 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
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 STAT courses from the following:		6
STAT 460	Applied Survey Sampling	
STAT 463	Nonparametric Statistics	
STAT 469	Introduction to Biostatistics	
STAT 472	Time Series	
Select two courses from each group (A & B)		
Group A		6
PSYC 460	Sensation & Perception	
PSYC 461	Memory And Knowledge	
PSYC 463	Experimental Developmental Psychology	
PSYC 464	Attention & Thinking	
PSYC 465	Psychobiology	
PSYC 486	Neuropsychology	
Group B		6
PSYC 453	Organizational Psychology	
PSYC 468	Personality	
PSYC 470	Experimental Social Psychology	
PSYC 471	The Psychology Of Aging	
PSYC 472	Advanced Psychopathology	
PSYC 473	Child Psychopathology and Therapy	
PSYC 481	Health Psychology	
Other Courses Required		
ANTH 111	Introduction to Anthropology	3
BIOL 126	Human Biology	3
CSCI 114	Computer Applications	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	3
Total Credits		59

Program notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Biochemistry and Molecular Biology Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Biochem & Molecular Biology Requirements		
BIOC 460	Foundations of Biochemistry and Molecular Biology I ²	3
BIOC 460L	Foundations of Biochemistry I Laboratory	1
BIOC 461	Foundations of Biochemistry and Molecular Biology II ²	3
BIOC 473	Methods of Biochemical Research ²	4
BIOC 474	Methods of Recombinant DNA Technology ²	3
BIOC 483	Cellular Signal Transduction Processes and Metabolic Regulations ²	3
BIOC 487	Molecular Biology of Gene Expression	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 ¹	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory ¹	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	4
CHEM 380	Chemistry and Biochemistry Junior Seminar	1
CHEM 431	Analytical Chemistry I	3
CHEM 491	Seminar	2
ENGL 321 or ENGL 324	Writing in the Technical Professions Writing in the Sciences	3
MATH 165	Calculus I	4
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4
STAT 330	Introductory Statistics	3
BIOL 315 or PLSC 315	Genetics Genetics	3

STEM Electives

Select any level course from the following prefixes: ANSC, BIOL, BIOC, BOT, CE, CHEM, CSCI, ECE, IME, MATH, ME, MICR, PSCI, PHYS, PPTH, or STAT. 6-8

Science Electives (300-400 Level)

Select 300-400 level courses from the following prefixes: ANSC, BIOL, BIOC, BOT, CHEM, CSCI, MICR, PSCI, PHYS, PPTH, or STAT. No more than 6 credits from one prefix may apply. Research credits (CHEM 494/BIOC 494; CHEM 493/BIOC 493) may count towards 3 of these credits. 9

Total Credits**91-93**

¹ Students may take the higher level CHEM 150/160 for CHEM 121/121L and CHEM 151/161 for CHEM 122/122L.

² 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 and Program 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.

Biochemistry Minor

Minor Requirements

Minimum Credits Required: 16		
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 department will be required to complete a substitution/waiver form with the courses to be applied to the biochemistry minor. The form must be 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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 or MATH 165	Applied Calculus I (May satisfy general education category R) ² Calculus I	4
STAT 330	Introductory Statistics	3
BIOL 189	Skills for Academic Success ¹	1

BIOL 270	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	Organic Chemistry I and Organic Chemistry I Laboratory	
& CHEM 342 & CHEM 342L	and Organic Chemistry II and Organic Chemistry II Laboratory	
Select one from the following:		3 or 8
PHYS 120	Fundamentals of Physics (or)	
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	
& PHYS 212 & PHYS 212L	and College Physics II and College Physics II Laboratory	
Select 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 401	Science Communication	
BIOL 410	Comparative Chordate Morphology	
BIOL 414	Plant Taxonomy	
BIOL 444	Vertebrate Histology	
BIOL 450	Invertebrate Zoology	
BIOL 452	Ichthyology	
BIOL 454	Herpetology	
BIOL 456	Ornithology	
BIOL 458	Mammalogy	
BIOL 460	Animal Physiology	
BIOL 461	Plant Ecology	
BIOL 462	Physiological Ecology	
BIOL 463	Animal Behavior	
BIOL 464	Endocrinology	
BIOL 465	Hormones and Behavior	
BIOL 470	Freshwater Ecology and Limnology	

BIOL 472	Structure and Diversity of Plants and Fungi
BIOL 475	Conservation Biology
BIOL 476	Wildlife Ecology and Management
BIOL 477	Wildlife and Fisheries Management Techniques
BIOL 479	Biomedical Genetics and Genomics
BIOL 480	Ecotoxicology
BIOL 481	Wetland Science
BIOL 482	Developmental Biology
BIOL 483	Cellular Mechanisms of Diseases

Total Credits**24-34****Biomedical sciences emphasis**

Code	Title	Credits
BIOL 370	Cell Biology	3
CHEM 341	Organic Chemistry I	3
CHEM 341L	Organic Chemistry I Laboratory	1
CHEM 342	Organic Chemistry II	3
CHEM 342L	Organic Chemistry II Laboratory	1
PHYS 211	College Physics I	3
PHYS 211L	College Physics I Laboratory	1
PHYS 212	College Physics II	3
PHYS 212L	College Physics II Laboratory	1
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
Select 12 credits from the following - at least 9 credits must have BIOL prefix		12
BIOC 461	Foundations of Biochemistry and Molecular Biology II	
BIOL 410	Comparative Chordate Morphology	
BIOL 444	Vertebrate Histology	
BIOL 460	Animal Physiology	
BIOL 464	Endocrinology	
BIOL 465	Hormones and Behavior	
BIOL 479	Biomedical Genetics and Genomics	
BIOL 482	Developmental Biology	
BIOL 483	Cellular Mechanisms of Diseases	
MICR 350	General Microbiology	
MICR 460	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	Organic Chemistry I and Organic Chemistry I Laboratory	
& CHEM 342 & CHEM 342L	and Organic Chemistry II and Organic Chemistry II Laboratory	
Select one from the following:		3 or 8
PHYS 120	Fundamentals of Physics	

PHYS 211 & 211L & 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 Taxonomy	
BIOL 450	Invertebrate Zoology	
BIOL 452	Ichthyology	
BIOL 454	Herpetology	
BIOL 456	Ornithology	
BIOL 458	Mammalogy	
BIOL 460	Animal Physiology	
BIOL 461	Plant Ecology	
BIOL 462	Physiological Ecology	
BIOL 463	Animal Behavior	
BIOL 470	Freshwater Ecology and Limnology	
BIOL 472	Structure and Diversity of Plants and Fungi	
BIOL 475	Conservation Biology (if not used to meet the above requirement)	
BIOL 476	Wildlife Ecology and Management (if not used to meet the above requirement)	
BIOL 477	Wildlife and Fisheries Management Techniques	
BIOL 480	Ecotoxicology	
BIOL 481	Wetland Science	
RNG 450	Range Plants	
ENT 350	General Entomology	
ENT 470	Insect Ecology	
MICR 350	General Microbiology	
MICR 452	Microbial Ecology	
MICR 460	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 Taxonomy	
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.

Biological Sciences Minor

Minor Requirements

Minimum Credits Required: 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
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 Taxonomy	
BIOL 444	Vertebrate Histology	
BIOL 450	Invertebrate Zoology	
BIOL 452	Ichthyology	
BIOL 454	Herpetology	
BIOL 456	Ornithology	
BIOL 458	Mammalogy	
BIOL 460	Animal Physiology	
BIOL 461	Plant Ecology	
BIOL 462	Physiological Ecology	
BIOL 463	Animal Behavior	
BIOL 464	Endocrinology	
BIOL 465	Hormones and Behavior	

BIOL 470	Freshwater Ecology and Limnology
BIOL 472	Structure and Diversity of Plants and Fungi
BIOL 475	Conservation Biology
BIOL 476	Wildlife Ecology and Management
BIOL 477	Wildlife and Fisheries Management Techniques
BIOL 479	Biomedical Genetics and Genomics
BIOL 480	Ecotoxicology
BIOL 481	Wetland Science
BIOL 482	Developmental Biology
BIOL 483	Cellular Mechanisms of Diseases

Total Credits**17**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Classes taken for the biological sciences minor cannot be double-counted with courses taken to fulfill botany and/or zoology minors. The credits must be unique from courses used to fulfill the biological sciences minor. The only classes that can be double counted are BIOL 150/L, 151/L, and 359.

Biological Sciences Education Major

Major Requirements

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

Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		

Total Credits**39**

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 Minor

Minor Requirements

Minimum Credits Required: 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 or BIOL 460	Cell Biology Animal Physiology	3
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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major requirements

Code	Title	Credits
Biotechnology Requirements		
MICR 189	Skills for Academic Success ¹	1
CSCI 114 or CSCI 122	Computer Applications Visual BASIC	3
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	The Science Toolkit: Skills for Scientific Success	
MICR 445	Animal Cell Culture Techniques ²	
MICR 454	Biotechnology for Sustainability ²	
MICR 457	Microbiomes: Agriculture and Environmental Resilience 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 required for first-year students and transfer students new to NDSU.

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.

Biotechnology Minor

Minor Requirements

Minimum Credits Required: 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 357	Animal Genetics	
MICR 454	Biotechnology for Sustainability	
MICR 455	Microbial Biotechnology	
MICR 457	Microbiomes: Agriculture and Environmental Resilience	
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 Minor

Minor Requirements

Minimum Credits Required: 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 Taxonomy	
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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	
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 and SCM 460.		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		93

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 460	Production & Operations Management	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	
Total Credits		12

Business Administration Minor

Minor Requirements

Minimum Credits Required: 24		
Code	Title	Credits
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	
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.
- A maximum of 9 credits can be applied to the minor from courses completed outside of NDSU.

- 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

Certificate Requirements

Minimum Credits Required: 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 Major

Major Requirements

Degree Type: B.S.

Minimum Required Credits: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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

Certificate of Completion Requirements

Minimum Credits Required: 8

Code	Title	Credits
SPAN 101	First-Year Spanish I	4
SPAN 102	First-Year Spanish II	4
Total Credits		8

Certificate Eligibility:

- Students must declare this certificate with the Office of Registration and Records.
- 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.

Certificate of Completion: Second-Year Spanish

Certificate of Completion Requirements

Minimum Credits Required: 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 with the Office of Registration and Records.
- 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.

Certificate of Completion: Third-Year Spanish

Certificate of Completion Requirements

Minimum Credits Required: 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 with the Office of Registration and Records.
- 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.

Chemistry Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 and Biochemistry 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	Foundations of Biochemistry I Laboratory	1
CHEM 491	Seminar	2
ENGL 321 or ENGL 324	Writing in the Technical Professions Writing in the Sciences	3
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. 12-33

Total Credits 74-95

Option 1: ACS Certified Chemistry

Code	Title	Credits
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory ¹	5
CHEM 432 & 432L	Analytical Chemistry II and Analytical Chemistry II Laboratory ¹	4
MATH 266	Introduction to Differential Equations	3

Total Credits 12

Option 2: ACS Certified w/Biochemistry Option

Code	Title	Credits
BIOC 461	Foundations of Biochemistry and Molecular Biology II ¹	3
BIOC 473	Methods of Biochemical Research ¹	4
BIOC 474	Methods of Recombinant DNA Technology	3
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory ¹	5
MATH 266	Introduction to Differential Equations	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
Select 6 credits of the following (Biology):		6
BIOL 315 & 315L	Genetics and Genetics Laboratory	
MICR 352	The Science Toolkit: Skills for Scientific Success	
BIOL 370	Cell Biology	

Total Credits 33

Option 3: Coating & Polymeric Materials

Code	Title	Credits
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory ¹	5
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 27

Option 4: Pre-Professional Option

Code	Title	Credits
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 425	Inorganic Chemistry I ¹	3
MATH 266 or STAT 330	Introduction to Differential Equations Introductory Statistics	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
Total Credits		23

Option 5: Chemistry Pre-Education

Application must be made to the School of Education in order to obtain a teaching degree.

Code	Title	Credits
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 425	Inorganic Chemistry I ¹	3
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
MATH 266 or STAT 330	Introduction to Differential Equations Introductory Statistics	3
PHYS Elective		3
Recommended for Education Option		
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
Total Credits		27

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.**

Chemistry Minor

Minor Requirements

Minimum Credits Required: 19

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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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.

Civil Engineering Major

Major Requirements

Degree Type: B.S.C.E.
Minimum Credits Required: 130

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 or ME 351	Thermodynamics and Heat Transfer Thermodynamics I	3
PHYS 252	University Physics II	4
Technical Electives Required: Select 12 credits from the following:		12
Structures:		
CE 411	Design of Pre-stressed Concrete (Design Credits 1.0)	
CE 425	Bridge Evaluation and Rehabilitation (Design Credits 1.5)	
CE 430	Timber and Form Design (Design Credits 1.5)	
CE 441	Finite Element Analysis (Design Credits 1.0)	
CE 445	Advanced Steel Design (Design Credits 1.0)	
CE 446	Basic Dynamics of Structures (Design Credits 1.0)	
CE 447	Stability of Structures (Design Credits 1.5)	
CM&E 465	Bridge Engineering and Management (Design Credits 1.5)	
Water Resources:		
CE 421	Open Channel Flow (Design Credits 1.5)	
CE 474	Groundwater Sustainability Design (Design Credits 1.5)	
CE 476	Watershed Modeling (Design Credits 1.5)	
CE 477	Applied Hydrology (Design Credits 1.5)	
Environmental:		
CE 410	Water and Wastewater Engineering (Design Credits 1.5)	
CE 471	Environmental Nanotechnology (Design Credits 1.5)	
CE 472	Solid 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 Minor

Minor Requirements

Minimum Credits Required: 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:		9
CHEM 240	Survey of Organic Chemistry ^{2,5}	
CHEM 341	Organic Chemistry I ^{1,5}	
CHEM 341L	Organic Chemistry I Laboratory ^{1,4}	
CHEM 342	Organic Chemistry II ^{1,5}	
CHEM 342L	Organic Chemistry II Laboratory ^{1,4}	
CPM 436	Biopolymers and Biocomposites	
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.
- ⁴ CHEM 353 & CHEM 354 can be substituted for CHEM 341L & CHEM 342L.
- ⁵ 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 Minor

Minor Requirements

Minimum Credits Required: 18

Code	Title	Credits
Required Courses		
SOC 405	Community Development	3
DREM 410	Comprehensive Emergency Management Planning	3
Economic Electives		
Select at least one course from the following:		3
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	
FIN 320	Principles of Finance	
FIN 410	Investment Analysis and Management	
FIN 430	Management of Financial Institutions	
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 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	
DREM 101	Emergencies, Disasters, and Catastrophes	
DREM 683	Disaster Recovery	

DREM 461	Business Continuity and Crisis Management
GEOG 455	Introduction to Geographic Information Systems
POLS 360	Principles of Public Administration
SOC 431	Environmental Sociology
SOC 439	Social Change
SOC 465	Applied Demographics
SOC/BUSN/ECON 196	Field Experience (or 296, 396, 496; no more than 3 credits)
SOC/BUSN/ECON 199	Special Topics (or 299, 399, 499; no more than 3 credits)

Additional Elective

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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required:120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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
Tertiary Concentration - One tertiary concentration from the science area not selected for the primary or secondary areas.	8

Math Requirements

Select the math requirement based on choice of primary concentration. See math requirement section below.	6-18

Professional Education Requirements

EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I:	2-3
EDUC 482	Classroom Practice/Methods of Teaching II:	2-3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3

Total Credits	97-116

Primary Concentration

Code	Title	Credits

Primary Concentration

Select one primary concentration from biology, chemistry, earth science, or physics.

Biology (24 credits)

BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
BIOL 359	Evolution	3
BIOL 364	General Ecology	3
BIOL 370	Cell Biology	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3

Chemistry (25 credits)

Select one introductory chemistry sequence (A or B)	8

Sequence A:

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	

Sequence B:

CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	4
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory	5
BIOC 260	Elements of Biochemistry	4

Earth Science (25 credits)

GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
GEOL 350	Invertebrate Paleontology	3
GEOL 303	Paleontology Field Course	1
GEOL 412	Geomorphology	3
GEOL 420 & GEOL 421	Mineralogy and Mineralogy Laboratory	4
PHYS 110	Introductory Astronomy	3
SOIL 217	Introduction to Meteorology & Climatology	3
Physics (24 credits)		
PHYS 171	Introductory Projects in Physics	1
PHYS 215	Research For Undergraduates	1-3
PHYS 251 & 251L & 251R	University Physics I and University Physics I Laboratory and University Physics I Recitation	6
PHYS 252 & 252L & 252R	University Physics II and University Physics II Laboratory and University Physics II Recitation	6
PHYS 350	Modern Physics	3
PHYS 355	Classical Mechanics	3
PHYS 361	Electromagnetic Theory	3

Secondary Concentration

Code	Title	Credits
Secondary Concentration		
Select two secondary concentrations not selected as the primary.		
Biology (14 credits)		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 315	Genetics	3
BIOL 359	Evolution	3
Chemistry (12 credits)		
Select one introductory chemistry sequence (A or B)		8
Sequence A:		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Sequence B:		
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
Earth Science (14 credits)		
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
PHYS 110	Introductory Astronomy	3

SOIL 217	Introduction to Meteorology & Climatology	3
Physics (12 credits)		
PHYS 110 & 110L	Introductory Astronomy and Introductory Astronomy Lab	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4

Tertiary Concentration

Code	Title	Credits
Tertiary Concentration		

Select one tertiary concentration not selected as the primary or secondary concentrations.

Biology (8 credits)		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
Chemistry (8 credits)		
Select one introductory chemistry sequence (A or B)		8
Sequence A:		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Sequence B:		
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
Earth Science (8 credits)		
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
Physics (8 credits)		
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4

Math Requirement

Code	Title	Credits
Math Requirement		

Select the math requirement based on the choice of primary concentration.

Biology or Earth Science (6-7 credits)		
MATH 105 or MATH 146	Trigonometry Applied Calculus I	3 or 4
STAT 330	Introductory Statistics	3
Chemistry (11 credits)		
MATH 165	Calculus I	4
MATH 166	Calculus II	4
STAT 330	Introductory Statistics	3
Physics (18 credits)		

MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 129	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 Major

Major Requirements

Degree Type: B.S.Cpr.E
Minimum Credits Required: 126

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 211	Circuit Analysis I	4
ECE 275	Digital Design	4
ECE 311	Circuit Analysis II	4
ECE 320	Electronics I	4
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	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	4
CSCI 222	Discrete Mathematics	3
Other Courses Required		
CHEM 121	General Chemistry I	3
CHEM 121L or PHYS 251L	General Chemistry I Laboratory University Physics I Laboratory	1
PHYS 251	University Physics I	4
ENGR 327	Ethics, Engineering, and Technology	3
Select one from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Core Electives		
Select 4 courses from the following:		12
ECE 423	VLSI Design	
ECE 425	Introduction to Semiconductor Devices	
ECE 474	Computer Architecture	
ECE 476	Advanced Embedded Systems	
ECE 477	Hardware Design for Machine Learning	
CSCI 467	Algorithm Analysis	
CSCI 474	Operating Systems Concepts	
ECE Electives		
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.		6
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 483	Instrumentation for Engineers	

ECE 485	Biomedical Engineering
CSCI 459	Foundations of Computer Networks
CSCI 413	Principles of Software Engineering

Tech Electives

Select 3 credits from the following: 3

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 107

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 and Mathematics Dual Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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	
Category L: Digital Literacy	
Total Credits	39

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	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 (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 (recommend one of the following):		3
CSCI 455	Networking and Parallel Computation	
CSCI 474	Operating Systems Concepts	
or any CSCI 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 Dual Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 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 satisfying a required course.	6
Physics Major Requirements:		
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 361	Electromagnetic Theory (or PHY 370: Electromagnetic Theory at MSUM)	3
PHYS 355	Classical Mechanics (or PHY 330: Intermediate Mechanics at MSUM)	3
PHYS 485	Quantum Mechanics I	3
Physics Electives: Select from the following:		15
PHYS 215	Research For Undergraduates	
PHYS 360	Modern Physics II	
PHYS 370	Introduction to Computational Physics	
PHYS 411	Optics for Scientists & Engineers	
PHYS 413	Lasers for Scientists and Engineers	
PHYS 415	Elements of Photonics	
PHYS 430	Quantum Computation	
PHYS 462	Thermal and Statistical Physics	
PHYS 481	Materials Physics	
PHYS 486	Quantum Mechanics II	
PHYS 488	Senior Project I (If not used to satisfy project requirement)	
PHYS 489	Senior Project II (If not used to satisfy project requirement)	
MSUM AST	Astronomy courses (300/400-level) with departmental permission.	
Related Required Courses		
MATH 129 or MATH 329	Basic Linear Algebra Intermediate Linear Algebra	3
MATH 165	Calculus I	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 or PHYS 488 & PHYS 489	Software Projects Capstone Senior Project I and Senior Project II	3
Total Credits		97

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Computer Science Foundations Certificate

Certificate Requirements

Minimum Credits Required: 10

Code	Title	Credits
CSCI 160 or CSCI 228	Computer Science I Computing Fundamentals in Python II	3 or 4
CSCI 161	Computer Science II	4
CSCI 277	Introduction to UNIX	3
Total Credits		10-11

Computer Science Major (B.A.)

Major Requirements

Degree Type: B.A.

Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

A Grade of 'C' or better is required for all CSCI prefix courses.

Code	Title	Credits
B.A. Computer Science Core Requirements		
CSCI 114 or TL 116	Computer Applications (May satisfy general education category S) Business Software Applications	3
CSCI 159	Computer Science Problem Solving	3
CSCI 160 or CSCI 227 & CSCI 228	Computer Science I Computing Fundamentals in Python I and Computing Fundamentals in Python II	4 or 6
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.

Computer Science Major (B.S.)

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 or CSCI 227 & CSCI 228	Computer Science I Computing Fundamentals in Python I and Computing Fundamentals in Python II	4 or 6
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 or STAT 330 & STAT 331	Statistics Introductory Statistics and Regression Analysis	3 or 5

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 305	Principles of Cybersecurity	
CSCI 403	Defensive Cybersecurity	
CSCI 404	Ethical Hacking	
CSCI 408	Malware Detection, Analysis and Threat Mechanisms	
CSCI 409	Cybersecurity Law and Policy	
CSCI 410	Cybersecurity 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)

Computer Science Minor

Minor Requirements

Minimum Credits Required: 16

Minor Requirements

Minimum Credits Required: 16		
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.

Computer Science Certificate

Certificate Requirements

Minimum Credits Required: 11

Certificate Requirements

Minimum Credits Required: 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

Computing Systems Certificate

Certificate Requirements

Minimum Credits Required: 9

Code	Title	Credits
CSCI 336 or CSCI 359	Theoretical Computer Science Networking	3
CSCI 374	Computer Organization and Architecture	3
CSCI 474	Operating Systems Concepts	3
Total Credits		9

Construction Engineering Major

Major Requirements

Degree Type: B.S.Cons.E.
Minimum Credits Required: 129

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 or CE 425	Bridge Engineering and Management 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 or ENGL 321	Business and Professional Writing Writing in the Technical Professions	3
ENGR 327	Ethics, Engineering, and Technology	3
GEOL 105 or GEOL 106	Physical Geology The Earth Through Time	3
PHYS 252	University Physics II	4
STAT 330	Introductory Statistics	3
Select one from the following:		3
ECON 105 or ECON 201 or ECON 202	Elements of Economics Principles of Microeconomics 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 Major

Major Requirements

Degree Type: B.S.Cons.M.
Minimum Credits Required: 123

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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

Category L: Digital Literacy

Total Credits**39****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 or ENGL 321	Business and Professional Writing Writing in the Technical Professions	3
GEOL 105 or GEOL 106	Physical Geology The Earth Through Time	3
MATH 105 or MATH 107	Trigonometry Precalculus	3
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 or ACCT 200	Fundamentals of Accounting Elements of Accounting I	3
Select one ECON course from the following:		3
ECON 105 or ECON 201 or ECON 202	Elements of Economics Principles of Microeconomics Principles of Macroeconomics	
MGMT 320	Foundations of Management	3
MRKT 320 or FIN 320	Foundations of Marketing Principles of Finance	3
BUSN 431	Business Law I-Contracts, Property and Torts	3
BA Minor 300/400 Elec. I 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 Certificate

Certificate Requirements

Minimum Required Credits: 9

Code	Title	Credits
CSCI 222	Discrete Mathematics	3
CSCI 366	Database Systems	3
CSCI 372 or CSCI 312	Comparative Programming Languages Survey of Programming Languages	3
Total Credits		9

Creative Writing Minor

Minor Requirements

Minimum Credits Required: 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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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

Category L: Digital Literacy

Total Credits	39

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 or CJ 410	Corrections ¹ Police & Society	3
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).

Criminal Justice Minor

Minor Requirements

Minimum Credits Required: 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 Major

Major Requirements

Degree Type: B.S.

Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 423	Principles of Weed Science ²	3
PLSC 455	Cropping Systems:An Integrated Approach ²	3
PLSC 491	Seminar	1

PPTH 424 & 424L	Fundamental Plant Pathology and Fundamental Plant Pathology Laboratory ²	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.

Total Credits **73-80**

Agronomy Option

For students interested in production agriculture.

Code	Title	Credits
Agronomy Requirements		
BIOL 461 or BIOC 260 or CHEM 240	Plant Ecology ² Elements of Biochemistry Survey of Organic Chemistry	3-4
MATH 103	College Algebra (or higher)	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
SOIL 422	Soil Fertility and Fertilizers ²	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 or MATH 146	Trigonometry Applied Calculus I	3-4
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PLSC 453 or PLSC 431	Advanced Weed Science ² Intermediate Genetics	2-3
PLSC 484	Plant Tissue Culture and Biotechnology ²	3
Total Credits		16-18

Crop Pathology Option

For students interested in protecting agronomic crops from diseases or preparation for Plant Pathology MS.

Code	Title	Credits
Crop Pathology Requirements		
MATH 103	College Algebra	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	4
PLSC 431	Intermediate Genetics	3
PPTH 435	Principles of Plant Disease Management	1
PPTH 436	Fungicide: Basics, Resistance, and Emerging Trends	1
PPTH 460	Fungal Biology	3
SOIL 422	Soil Fertility and Fertilizers	3
Select two courses from below		2-3
PPTH 437	Practices of Plant Disease Management Research	
PPTH 442	Practical Nematology	

PPTH 443	Greenhouse Inoculation and Phenotyping of Crop Diseases	
PPTH 445	New Science and Technology in Crop Protection	
PPTH 447	Fundamentals of Molecular Techniques in Agriculture	
PPTH 448	Plant Disease Diagnostics and Quantification	
PPTH 457	Landscape Plant Pathology	
PPTH 462	Identification and Management of Non-Soybean Oil and Legume Crop Diseases	
PPTH 463	Identification and Management of Soybean and Corn Diseases	
PPTH 464	Identification and Management of Small Grain Diseases	
Total Credits		20-21

Weed Science Option

For students interested in crop consulting, weed management, and plant protection careers or graduate school.

Code	Title	Credits
Weed Science Requirements		
CHEM 240 or BIOC 260	Survey of Organic Chemistry Elements of Biochemistry	3-4
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
SOIL 422	Soil Fertility and Fertilizers ²	3
PPTH 462	Identification and Management of Non-Soybean Oil and Legume Crop Diseases ²	1
PPTH 463	Identification and Management of Soybean and Corn Diseases ²	1
PPTH 464	Identification and Management of Small Grain Diseases ²	1
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 or Plant Pathology 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.

Crop and Weed Science Minor

Minor Requirements

Minimum Credits Required: 18

Code	Title	Credits
Required Core Courses		
PLSC 110	World Food Crops	3
PLSC 225	Principles of Crop Production	3
Elective Courses		
Select two from the following:		6-7
PLSC 315 & 315L	Genetics and Genetics Laboratory (both lecture/lab must be taken to count as one selection)	
PLSC 420	Integrated Forage and Cover Crops Production Management and Ecosystem Services	

PLSC 423	Principles of Weed Science	
Select courses to meet the 18 credit minimum:		6
PLSC	300-400 Level	
PLSC 215	Weed Identification	
SOIL 210	Introduction to Soil Science	
ENT 350	General Entomology	
PPTH 424	Fundamental Plant Pathology	
PPTH 424L	Fundamental Plant Pathology Laboratory	
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 Minor

Minor Requirements

Minimum Credits Required: 18

Code	Title	Credits
SOC 110 or ANTH 111	Introduction to Sociology Introduction to Anthropology	3
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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 305	Principles of Cybersecurity	3
CSCI 366	Database Systems	3
CSCI 371	Web Scripting Languages	3
CSCI 374	Computer Organization and Architecture	3
CSCI 403	Defensive Cybersecurity	3
CSCI 404	Ethical Hacking	3
CSCI 408	Malware Detection, Analysis and Threat Mechanisms	3
CSCI 409	Cybersecurity Law and Policy	3
CSCI 410	Cybersecurity 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 or ENGL 324	Writing in the Technical Professions Writing in the Sciences	3
MATH 146 or MATH 165	Applied Calculus I Calculus I	4
STAT 367 or STAT 330	Probability Introductory Statistics	3
STAT 368 or STAT 331	Statistics Regression Analysis	3
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)	
DREM 150	Dealing with Terrorism, Cybersecurity and Other Emerging Threats	
DREM 435	Issues in Homeland Security and Emergency Management	

MATH 473

Cryptology

Total Credits**77**

Under Construction

Minor Requirements

Minimum Credits Required: 18

Code	Title	Credits
CSCI 105	Introduction to Cybersecurity	3
or CSCI 213	Modern Software Development	
CSCI 227	Computing Fundamentals in Python I	3
or CSCI 160	Computer Science I	
or CSCI 122	Visual BASIC	
or ECE 173	Introduction to Computing	
CSCI 305	Principles of Cybersecurity	3
CSCI 403	Defensive Cybersecurity	3
CSCI 404	Ethical Hacking	3
CSCI 410	Cybersecurity Forensics	3
or CSCI 408	Malware Detection, Analysis and Threat Mechanisms	
or CSCI 409	Cybersecurity Law and Policy	
or CSCI 411	Secure Software Development	
Total Credits		18

Cybersecurity Certificate

Certificate Requirements

Minimum Credits Required: 9

Code	Title	Credits
CSCI 403	Defensive Cybersecurity	3
or CSCI 305	Principles of Cybersecurity	
CSCI 404	Ethical Hacking	3
Select one course from the following:		3
CSCI 277	Introduction to UNIX	
CSCI 305	Principles of Cybersecurity (if not used above)	
CSCI 403	Defensive Cybersecurity (if not used above)	
CSCI 409	Cybersecurity Law and Policy	
CSCI 410	Cybersecurity Forensics	
CSCI 469	Network Security	
CSCI 473	Foundations of the Digital Enterprise	
Total Credits		9

Data Science Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	
CSCI 277	Introduction to UNIX	
ENGL 321 or ENGL 324	Writing in the Technical Professions Writing in the Sciences	3
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
STAT 460	Applied Survey Sampling	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	69

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 462	Introduction to Experimental Design	3
STAT 463	Nonparametric Statistics	3
STAT 464	Discrete Data Analysis	3
STAT 470	Statistical SAS Programming	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 below for a total of 12 credits.	12

IME 470	Operations Research I	

Total Credits	12

Data Science Certificate

Certificate Requirements

Minimum Credits Required: 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

Disaster Resilience and Emergency Management Major

Major Requirements

Degree Type: B.A. and B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

All courses required for this major must be earned with a grade of C or higher.

Code	Title	Credits
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 ¹	3
DREM 413	Disaster Mitigation ¹	3
DREM 431	Disaster Response ¹	3
DREM 451	Disaster Preparedness ¹	3
DREM 483	Disaster Recovery ¹	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

¹ Students accepted into the accelerated Master's Degree in Community Planning and Resilience program may take the 600 level course to satisfy these requirements.

Recommended minors: Business Administration, Communication, Community Development, Criminal Justice, Environmental Science, Food Safety, Geography, Logistics Management, Political Science, Psychology, or Sociology.

Disaster Resilience and Emergency Management Minor

Minor Requirements

Minimum Required Credits: 18

Code	Title	Credits
Core Requirement		
DREM 101	Emergencies, Disasters, and Catastrophes	3
Disaster Resilience and Emergency Management Phases		
Select two courses from the following:		6
DREM 413	Disaster Mitigation	
DREM 431	Disaster Response	
DREM 451	Disaster Preparedness	
DREM 483	Disaster Recovery	
Disaster Resilience and Emergency Management Electives		
Select two courses from the following:		6
DREM 150	Dealing with Terrorism, Cybersecurity and Other Emerging Threats	
DREM 220	Technology, Tools, and Assessments in Disaster	
DREM 325	World Disasters	
DREM 345	Understanding Vulnerable Populations in Disasters	
DREM 381	Disasters Through A Systems Lens	
DREM 413	Disaster Mitigation	
DREM 431	Disaster Response	
DREM 451	Disaster Preparedness	
DREM 461	Business Continuity and Crisis Management	
DREM 463	Voluntary Agency Disaster Services	
DREM 483	Disaster Recovery	
DREM 491	Seminar	
Additional Electives		
Select one from the following: ¹		3
CJ 315	Federal Law Enforcement and Crime Policy	
COMM 216	Intercultural Communication	
COMM 484	Organizational Advocacy and Issue Management	
COMM 485	Risk and Crisis Communication	
COMM 487	Organizational Power and Leadership	
HDFS 275	Diversity and Multiculturalism in Individual and Family Life	
POLS 120	Terrorism	

POLS 220	International Politics	
POLS 225	Comparative Politics	
SOC 235	Cultural Diversity	
SOC 404	Community Assessment	
SOC 405	Community Development	
SOC 410	Social Inequality	
SOC 412	Sociology of Gender	
SOC 440	Sociology of Aging	
Total Credits		18

¹ An additional DREM prefix course not used to fulfill any other minor requirement may be used to fulfill this category.

Economic Computation Certificate

Certificate Requirements

Minimum Credits Required: 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 or ECON 411	Econometrics ¹ Computational Economics	3
Total Credits		12

¹ Additional course prerequisites for ECON 410 and ECON 411 are required.

Economics Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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	
Category L: Digital Literacy	
Total Credits	39

Major Requirements

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: Standard, Quantitative, or Business Economics		33-47
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	
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 Language Proficiency requirements and 3 credits of 300-400 level humanities, social sciences or a study abroad experience. (Credits for language proficiency will vary depending on placement; 3-14 credits)		
Total Credits		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 or CSCI 159	Visual BASIC Computer Science Problem Solving	3
ECON 410 or ECON 411	Econometrics Computational Economics	3
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 259 or MATH 265 or CSCI 222	Multivariate Calculus Calculus III Discrete Mathematics	3-4
MATH 266 or STAT 368 or CSCI 366	Introduction to Differential Equations Statistics Database Systems	3
STAT 367 or STAT 467	Probability Probability and Mathematical Statistics I	3

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.

Economics Minor

Minor Requirements

Minimum Credits Required: 18

Code	Title	Credits
Required Courses		
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
ECON 341	Intermediate Microeconomics	3
Elective Courses		
ECON 300 or 400 Level		6
ECON 400 Level		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 Major

Major Requirements

Degree Type: B.S.E.E.

Minimum Credits Required: 126

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 211	Circuit Analysis I	4
ECE 275	Digital Design ²	4
ECE 311	Circuit Analysis II	4
ECE 320	Electronics I	4
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 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	3
ENGR 327	Ethics, Engineering, and Technology	3
PHYS 251	University Physics I	4
PHYS 252	University Physics II	4
Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Select one of the following lab courses:		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 375	Digital Design 2
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**105**

- 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. Courses not listed on the curriculum will require a substitution form to be submitted to the Office of Registration and Records for degree progress.

Electrical Engineering & Physics Dual Major

Major Requirements

Degree Type: B.S.E.E.

Minimum Credits Required: 135

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

- Minimum of 120 semester credits (some programs may exceed this minimum).
- Complete the University General Education requirements.
- Minimum institutional GPA of 2.00 based on work taken at NDSU.
- Minimum of 30 credits in resident at NDSU.
- Minimum of 36 upper level credits (courses numbered 300 or higher).
- Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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	
Category L: Digital Literacy	
Total Credits	39

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	4
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	Classical Mechanics 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 9 credits from the following ²		9
PHYS 215	Research For Undergraduates (2 credit minimum)	
PHYS 360	Modern Physics II	
PHYS 370	Introduction to Computational Physics	
PHYS 430	Quantum Computation	
PHYS 462	Thermal and Statistical Physics	
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		112-113

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 Dual Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 126

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
HDFS & Elementary Education Requirements		
HDFS 230 or PSYC 250	Life Span Development Developmental Psychology	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 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 or GEOL 106	Physical Geology The Earth Through Time	3
HIST 103 or HIST 104	U.S. to 1877 U.S. Since 1877	3
MATH 104 or STAT 330	Finite Mathematics Introductory Statistics	3
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 the HDFS prefix major courses and the 9 credits of HDFS electives.
- 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 .

Energy Engineering Minor

Minor Requirements

Minimum Credits Required: 18

This minor can be completed with a single energy certificate (Track One) approach or a two energy certificate (Track Two) approach.

Track One - Single Energy Certificate Approach

Code	Title	Credits
Required Course		
ME 350	Thermodynamics and Heat Transfer	3
or ME 351	Thermodynamics I	
Select one Energy Certificate from the following:		9
UG Cert Energy Engineering - Buildings		
UG Cert Energy Engineering - Generation		
UG Cert Energy Engineering - Vehicles		
Complete two courses from the following:		6
ABEN 444	Transport Processes	
ABEN 452	Bioenvironmental Systems Design	
ABEN 456	Biobased Energy	
ABEN 473	Agricultural Power	
ECE 431	Power Systems	
ECE 432	Computational Methods in Power Systems	
ECE 433	Power Systems Design	
ME 469	Energy Storage Technology	
ME 470	Renewable Energy Technology	
ME 481	Fundamentals of Energy Conversion	
ME 484	Aerospace Propulsion	
ME 487	Internal Combustion Engines	
ME 482	Fuel Cell Science and Engineering	
ME 485	Heating, Ventilation and Air Conditioning	
CM&E 431	Sustainable Design and Construction	
ME 397	Fe/Coop Ed/Internship ¹	
or ABEN 496	Field Experience	

or ECE 397

Fe/Coop Ed/Internship

Total Credits	18

Track Two - Two Certificate Approach

Code	Title	Credits
Complete two Energy Engineering Certificates		18
UG Cert Energy Engineering - Generation		
UG Cert Energy Engineering - Vehicles		
UG Cert Energy Engineering - Buildings		
Total Credits		18

¹ The company or co-op project must be energy or energy-related and should be related to the focus area of the certificate. Approved by the Energy Stewardship Professor is required. The co-op must meet the requirements for 'co-op as a technical elective.'

Program Notes

- Students must be aware of all course per-requisites for courses listed in this program.
- A course applied to one certificate cannot also count toward a second Energy Engineering certificate.

Energy Engineering Buildings Certificate

Certificate Requirements

Minimum Credits Required: 9

Code	Title	Credits
Select 9 credits from the following:		9
ME 469	Energy Storage Technology	
ME 485	Heating, Ventilation and Air Conditioning	
ABEN 452	Bioenvironmental Systems Design	
CM&E 431	Sustainable Design and Construction	
Co-op/Internship taken as a Technical Elective (ME 397, ABEN 496, or ECE 397) ¹		
Total Credits		9

¹ The company or co-op project must be energy-related and should be related to the focus area of the certificate. Approval by the Energy Stewardship professor is required. The co-op must meet the requirements for 'co-op as a technical elective'.

Program Notes:

- Student must be aware of pre-requisites for the courses listed.
- A course applied to one certificate cannot also count towards a second Energy Engineering certificate.

Energy Engineering Generation Certificate

Certificate Requirements

Minimum Credits Required: 9

Code	Title	Credits
Select 9 credits from the following:		9
ME 469	Energy Storage Technology	
ME 470	Renewable Energy Technology	
ME 481	Fundamentals of Energy Conversion	
ME 482	Fuel Cell Science and Engineering	
ABEN 456	Biobased Energy	

Co-op/Internship taken as a Technical Elective (ME 397, ABEN 496, or ECE 397) ¹

Total Credits

9

¹ The company or co-op project must be energy-related and should be related to the focus area of the certificate. Approval by the Energy Stewardship professor is required. The co-op must meet the requirements for 'co-op as a technical elective'.

Program Notes:

- Student must be aware of pre-requisites for the courses listed.
- A course applied to one certificate cannot also count towards a second Energy Engineering certificate.

Energy Engineering Vehicles Certificate

Certificate Requirements

Minimum Credits Required: 9

Code	Title	Credits
Select 9 credits from the following:		9
ME 469	Energy Storage Technology	
ME 484	Aerospace Propulsion	
ME 487	Internal Combustion Engines	
ABEN 473	Agricultural Power	
ECE 437	Power Electronics	
Co-op/Internship taken as a Technical Elective (ME 397, ABEN 496, or ECE 397) ¹		
Total Credits		9

¹ The company or co-op project must be energy-related and should be related to the focus area of the certificate. Approval by the Energy Stewardship professor is required. The co-op must meet the requirements for 'co-op as a technical elective'.

Program Notes:

- Students must be aware of pre-requisites for the courses listed.
- A course applied to one certificate cannot also count towards a second Energy Engineering certificate.

English Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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

English Minor

Minor Requirements

Minimum Credits Required: 21

Students complete one option: Literature or Writing

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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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
English Literature Electives 300-400 Level		
Select two classes from the following:		6
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 379	Global Seminar
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

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 competency (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 Minor

Minor Requirements

Minimum Credits Required: 16

Code	Title	Credits
Core Requirements		
ENTR 201 or MGMT 470	Introduction to Entrepreneurship Entrepreneurship/Small Business Management	3
ENTR 301 or ENGR 310 or ENTR 440 or MGMT 471 or MGMT 472 or MRKT 432	Entrepreneurship Toolbox I Entrepreneurship for Engineers and Scientists International Entrepreneurship Leading Social Entrepreneurship and Nonprofit Organizations Managing Family Enterprises Entrepreneurial Sales	3
ENTR 401	Entrepreneurship Capstone ⁴	3
Select one from the following:		4-6
ENTR 496	Practicum/Internship	
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.

Entrepreneurship Certificate

Certificate Requirements

Minimum Credits Required: 9

Code	Title	Credits
ENTR 201 or MGMT 470	Introduction to Entrepreneurship Entrepreneurship/Small Business Management	3
ENTR 301 or ENGR 310 or ENTR 440 or MGMT 471 or MGMT 472	Entrepreneurship Toolbox I Entrepreneurship for Engineers and Scientists International Entrepreneurship Leading Social Entrepreneurship and Nonprofit Organizations Managing Family Enterprises	3
ENTR 401	Entrepreneurship Capstone	3
Total Credits		9

Environmental Engineering Major

Major Requirements

Degree Type: B.S. Env.E.
Minimum Credits Required: 131

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

- Minimum of 120 semester credits (some programs may exceed this minimum).
- Complete the University General Education requirements.
- Minimum institutional GPA of 2.00 based on work taken at NDSU.
- Minimum of 30 credits in resident at NDSU.
- Minimum of 36 upper level credits (courses numbered 300 or higher).
- Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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	

Category L: Digital Literacy	

Total Credits	39

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	Freshwater Ecology and Limnology ¹	
BIOL 480	Ecotoxicology ¹	
BIOL 481	Wetland Science ¹	
CE 486	Nanotechnology and Nanomaterials	
GEOG 455	Introduction to Geographic Information Systems	
GEOG 456	Advanced Geographic Information Systems ¹	
GEOG 465	Remote Sensing of the Environment	
RNG 452	Managing Natural and Rangeland Resources using GIS	
or NRM 452	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 Minor

Minor Requirements

Minimum Credits Required: 19

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 461	Advanced Horsemanship and Equitation	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 ¹

American Heart Association or American Red Cross First Aid and CPR Certification

Total Credits**19**

¹ 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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		

Total Credits**39****Major Requirements**

Code	Title	Credits
Required Core Courses for Equine Science		
ANSC 101	Student Success Techniques - Animal and Equine Science	1

or ANSC 102	Student Success Techniques - Animal Sciences with Pre-Veterinary Medicine Emphasis	
or VETS 101	Student Success Techniques: Veterinary Technology	
ANSC 218	Anatomy and Physiology of Domestic Animals	3
ANSC 223	Introduction to Animal Nutrition	3
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	1
or ANSC 361	Intermediate Horsemanship	
ANSC 300	Domestic Animal Behavior and Management	3
ANSC 357	Animal Genetics	3
ANSC 360	Equine Nutrition	3
ANSC 364	Equine Anatomy and Physiology	3
ANSC 370	Fundamentals/Animal Disease	3
ANSC 379	Global Seminar	2
or ANSC 393	Undergraduate Research	
or ANSC 396	Field Experience	
ANSC 463 & 463L	Physiology of Reproduction and Physiology of Reproduction Laboratory	4
ANSC 478	Research and Issues in Animal Agriculture	3
ANSC 480	Equine Industry and Production Systems	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
ECON 201	Principles of Microeconomics	3
MATH 103	College Algebra	3
or MATH 105	Trigonometry	
or MATH 107	Precalculus	
or MATH 146	Applied Calculus I	
STAT 330	Introductory Statistics	3

Program Option

Students must select one program option of interest to complete the major. The standard option for this major is the Equine Production, Management and Husbandry. Students who wish to declare an option other than Option One must officially declare that option with the Office of Registration and Records. 27-29

Total Credits **88-90**

Option 1: Equine Production, Management, and Husbandry (Standard)

Code	Title	Credits
ANSC 361	Intermediate Horsemanship ¹	1
ANSC 461	Advanced Horsemanship and Equitation	1
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
or AGECE 246	Introduction to Agricultural Finance	
AGEC 342	Farm and Agribusiness Management II	3
AGEC 420	Integrated Farm and Ranch Management	3
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab	4
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
Equine Production, Management, and Husbandry Electives (choose any level course from AGECE, ANSC, ECON, NRM, RNG, PLSC, or SOIL).		6

Total Credits **27**

Option 2: Biomedical Science

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 444	Livestock Muscle Physiology	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
CHEM 240 or CHEM 341	Survey of Organic Chemistry ² Organic Chemistry I	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PHYS 120 & 120L or PHYS 211 & 211L	Fundamentals of Physics and Fundamentals of Physics Laboratory ² College Physics I and College Physics I Laboratory	4
PLSC 315	Genetics	3
Biomedical Sciences Electives (choose any 300+ level course from ANSC, BIOC, BIOL, CHEM, MICR, or VETS)		3
Total Credits		29

¹ The department's placement procedures will determine which course the student takes for the core requirements. Students that test and qualify for ANSC 361 initially must complete the course with a C or higher. In this case, failure to earn a C or higher in ANSC 361 means the student must take ANSC 261 and retake ANSC 361.

² Veterinary Schools generally require CHEM 341 and PHYS 211 and their respective lab, at a minimum. Be sure to consult an academic advisor based on veterinary schools you plan to apply to for additional pre-requisites needed.

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.

Equine Science Minor

Minor Requirements

Minimum Credits Required: 17

Code	Title	Credits
Required Courses		
ANSC 223	Introduction to Animal Nutrition	3
ANSC 260	Introduction to Equine Studies	2
ANSC 260L or ANSC 261	Equine Care and Management Practicum ¹ Basic Equitation & Horsemanship	1
ANSC 360 or ANSC 364	Equine Nutrition ¹ Equine Anatomy and Physiology	3
Elective Courses		
Select a minimum of 7 credits from the following:		7
ANSC 165	Animals and Human Health	
ANSC 260L	Equine Care and Management Practicum ¹	
ANSC 261	Basic Equitation & Horsemanship ¹	
ANSC 235	Equine Evaluation	
ANSC 300	Domestic Animal Behavior and Management	
ANSC 357	Animal Genetics	
ANSC 360	Equine Nutrition ¹	

ANSC 361	Intermediate Horsemanship	
ANSC 364	Equine Anatomy and Physiology ¹	
ANSC 370	Fundamentals/Animal Disease	
ANSC 461	Advanced Horsemanship and Equitation	
ANSC 463	Physiology of Reproduction	
ANSC 480	Equine Industry and Production Systems	
ANSC 496	Field Experience	
Total Credits		16

¹ Complete one course for the required minor requirements. The other course may be completed as an elective course.

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 Certificate

Certificate Requirements

Minimum Credits Required: 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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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	
Category L: Digital Literacy	
Total Credits	39

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 or TL 116	Computer Applications Business Software Applications	3
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
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		75

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 on the accelerated website.

- 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 Minor

Minor Requirements

Minimum Credits Required: 17

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	
H&CE 496	Field Experience (Internship) *	5-6
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	
Total Credits		17-18

* Additional Field Experience credit may be warranted if additional time in the internship experience is required.

Minor 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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 124

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
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 Pathway A (Licensure - Education Courses) or Pathway B (Non-Licensure Training and Development Courses)		22-28
Total Credits		94-100

Pathway A

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

Pathway B

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 Captstone)	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 Certificate

Certificate Requirements

Minimum Credits Required: 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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 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
SCM 320	Integrated Supply Chain Management	3
300-400 Level Electives ²		
Select any course prefix at the 300-400 level		6
Finance Electives or Commercial Banking Track ²		
Complete 12 credits of 300-400 level courses with the FIN prefix or declare the Commercial Banking Track with the Office of Registration and Records 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.

Finance Certificate

Certificate Requirements

Minimum Credit Required: 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 Safety Certificate

Certificate Requirements

Minimum Credits Required: 9

Code	Title	Credits
CFS 473	Food Safety	3
CFS 452	Food Laws and Regulations	3
MICR 453	Food Microbiology	2
MICR 453L	Food Microbiology Laboratory	1
Total Credits		9

Food Science Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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/ABEN 263	Biological Materials Processing	3
CFS 370	Food Processing I	3
CFS 450	Cereal Technology	3
CFS 452	Food Laws and Regulations	3
MICR 453	Food Microbiology	2
MICR 453L	Food Microbiology Laboratory	1
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 Foundations of Biochemistry I Laboratory	
BIOL 150	General Biology I	3
BIOL 151	General Biology II	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CSCI 114 or TL 116	Computer Applications (May satisfy general education category S) Business Software Applications	3
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
HNES 250	Nutrition Science (May satisfy general education category W)	3
MATH 146 or MATH 165	Applied Calculus I (May satisfy general education category R) Calculus I	4
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PHYS 211 & 211L	College Physics I and College Physics I Laboratory (May satisfy general education category S)	4
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Total Credits		88-89

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 Minor

Minor Requirements

Minimum Credits Required: 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 Minor

Minor Requirements

Minimum Credits Required: 23

Code	Title	Credits
Required Minor Classes		
CJ 260	Introduction to Forensic Science	3
CJ 430	Issues in Forensic Science	3
BIOL 111 or BIOL 150	Concepts of Biology ¹ General Biology I	3
BIOL 100L or BIOL 150L	Non-Majors Biology Lab ¹ General Biology I Laboratory	1
CHEM 117 or CHEM 121 or CHEM 150	Chemical Concepts and Applications ¹ General Chemistry I Principles of Chemistry I	3
CHEM 117L or CHEM 121L or CHEM 160	Chem Concepts and Applications Lab ¹ General Chemistry I Laboratory Principles of Chemistry Laboratory I	1
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 444	Vertebrate Histology
BIOL 479	Biomedical Genetics and Genomics (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)

Foundations of Mental Health Care Certificate

Certificate Requirements

Minimum Credits Required: 9		
Code	Title	Credits
HDFS 380	Introduction to Mental Health Professions	3
PHRM 468	Psychopharmacology for Health Professionals	3
CNED 406	Psychopathology in the Health Professions	3
Total Credits		9

Fraud Investigation Minor

Minor Requirements

Minimum Credits Required: 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 Certificate

Certificate Requirements

Minimum Credits Required: 9

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 Agriculture Minor

Minor Requirements

Minimum Credits Required: 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.

Geographic Information Systems Certificate

Certificate Requirements

Minimum Credits Required: 9

Code	Title	Credits
GIS 455	Introduction to Geographic Information Systems	3
GIS 456	Advanced Geographic Information Systems	3
Select one class from the following:		3
GEOG 465	Remote Sensing of the Environment	
GIS 480	Geographic Information Systems Pattern Analysis and Modeling	
GEOG 499	Special Topics	
Total Credits		9

Gerontology Minor

Minor Requirements

Minimum Required Credits: 17

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
PSYC 471	The Psychology Of Aging	
SOC 440	Sociology of Aging	
SOC 441	Death and Dying	
NURS 322	Gerontologic Nursing (Only open to students admitted to the Nursing program who have declared this minor.)	
Total Credits		17-18

Minor Requirements and Notes

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

Global Business Second Major

Secondary Major Requirements

Minimum Credits Required: 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	
ENTR 440	International Entrepreneurship	
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
or UNIV 492

Global Practicum: Study Abroad

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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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

Category L: Digital Literacy

Total Credits	39

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
DREM 325	World Disasters
DREM 345	Understanding Vulnerable Populations in Disasters
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 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 (3 one credit courses required for senior project.)	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.

Global Studies Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Core Requirement		
INTL 110	Introduction to Global Studies	3
GLBL 330	Globalization and the Digital Age (or GLBL prefix course at 300/400 level) ³	3
Select 2 courses from the following:		6
RELS 100 or RELS 355	World Religions 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
DREM 325	World Disasters
DREM 345	Understanding Vulnerable Populations in Disasters
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 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/Research 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.
- ³ May require department to submit a substitution form to count an alternative GBLBL course.

Global Studies Certificate

Certificate Requirements

Minimum Credits Required: 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**

Graphic Design Major

Major Requirements

Degree Type: BFA
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Foundation Studies in Studio		
ART 122	Studio Technology Foundations	3
ART 124	Foundations of Design	3
ART 131	Foundations Drawing	3
ART 335	Figure Drawing	3
Choose three (3) classes from the list below:		9
ART 120	Painting I	
ART 150	Ceramics I	
ART 160	Sculpture I	
ART 170	Printmaking I	
ART 180	Photography I	
ARMD 101	Beginning Apparel Construction	
Design Development Core		
ART 185	Graphic Design I	3
ART 385	Advanced Topics in Graphic Design	3
Choose three (3) courses from the list below:		9
ART 381	Typography & Layout	
ART 382	Branding & Packaging	

ART 383	Illustration Concepts & Narrative	
ART 384	Motion Graphics & Animation	
Design Experience Electives		
Choose three (3) classes from the list below		9
ART 320	Topics in Painting	
ART 350	Topics in Ceramics	
ART 380	Topics in Photography	
ART 385	Advanced Topics in Graphic Design	
ARMD 366	Textiles	
ARMD 371	Fashion Trend Analysis and Forecasting	
ARMD 373	Visual Merchandising and Promotion	
ARMD 472	Product Development	
COMM 376	Advertising Creative Strategies	
COMM 476	Advertising Campaign Practicum	
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
Professional Practices		
Choose four credits from the list of courses below:		4
ART 391	Seminar	
ART 491	Seminar	
UNIV 397	Fe/Coop Ed/Internship	
Baccalaureate Capstone		
Students must successfully complete a baccalaureate application with enough demonstrated depth in Graphic Design Studies to begin their Baccalaureate Capstone. Once approved students take 6 credits of Baccalaureate Project and 6 credits of Baccalaureate Studio courses over two consecutive semesters.		
ART 489	Baccalaureate Project	3
ART 485	Baccalaureate Studio: Graphic Design	3
ART 489	Baccalaureate Project	3
ART 485	Baccalaureate Studio: Graphic Design	3
Total Credits		79

Graphic Design Minor

Minor Requirements

Minimum Credits Required: 21

Code	Title	Credits
Design Development Core		
ART 185	Graphic Design I	3
ART 385	Advanced Topics in Graphic Design	3
Choose two (2) classes from the following:		6
ART 381	Typography & Layout	
ART 382	Branding & Packaging	
ART 383	Illustration Concepts & Narrative	
ART 384	Motion Graphics & Animation	
Design Experience Electives		
Choose two (2) classes from the following:		6
ART 320	Topics in Painting	

ART 350	Topics in Ceramics	
ART 380	Topics in Photography	
ART 385	Advanced Topics in Graphic Design	
ARMD 366	Textiles	
ARMD 371	Fashion Trend Analysis and Forecasting	
ARMD 373	Visual Merchandising and Promotion	
ARMD 472	Product Development	
Art History and Theory		
ART 453	Topics in Art History (History of Graphic Design)	3
Total Credits		21

Health Education Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Health Education Requirements		
HDFS 230 or PSYC 250	Life Span Development ² Developmental Psychology	3
HPER 217	Personal and Community Health ¹	3
PSYC 111	Introduction to Psychology	3
Teaching Specialty Requirements		
HPER 110	Introduction to Health and Physical Education ¹	3

HNES 250	Nutrition Science ²	3
HPER 341	Psychosocial Aspects of Health ¹	3
HPER 345	Materials and Concepts of Health Education ¹	3
HPER 367	Pedagogy of the Body for K-12	3
PSYC 210	Human Sexuality ²	3
PSYC 212	Psychological Aspects of Drug Use and Abuse ²	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) 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		61

¹ Students must earn a grade of 'B' or better in these courses.

² 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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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	
Category L: Digital Literacy	
Total Credits	39

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
Options ¹		
Students will need to select one of the options outlined below to complete the requirements for the major. Options include 1) Public Health Minor; 2) Business Administration Minor; 3) Master of Public Health in Community Health Services; or 4) Master of Public Health in Epidemiology and 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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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) ¹	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 240	"Cults" and New Religious Movements	
RELS 345	Church and State in America	
HIST 328	War and Society in America	
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	
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 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	
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

¹ 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.

History Minor

Minor Requirements

Minimum Credits Required: 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.
- The department must submit a substitution/waiver form identifying the courses that will make up the 18 credits for this minor and submit to the Office of Registration and Records.

Horticulture Minor

Minor Requirements

Minimum Credits Required: 17

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	
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.

Horticulture and Urban Agriculture Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	
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 available they must officially declare their option with the Office of Registration and Records. 34

Total Credits 73

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 457	Landscape Plant Pathology ²	2
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 33

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 457	Landscape Plant Pathology ²	
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	
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.

Hospitality & Tourism Management Minor

Minor Requirements

Minimum Credits Required: 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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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
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 67

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
HDFS 483	Best Practices, Play and Activities from Birth through Adolescence	3
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 the HDFS prefix major courses and the HDFS courses required for the 21 credit option.
- Courses taken *Pass/Fail* will not be used to satisfy any requirement other than total credits.
- STAT 330 is recommended to fulfill the Quantitative Reasoning General Education requirement, particularly for students intending to apply to graduate school.

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

Human Development and Family Science Minor

Minor Requirements

Minimum Credits 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.

Human Factors in Artificial Intelligence Certificate

Certificate Requirements

Minimum Credits Required:

Code	Title	Credits
COMM 112	Understanding Media and Social Change	3
COMM 466	Human Factors in Artificial Intelligence	3
COMM 467	User Experience Research in Artificial Intelligence	3
COMM 468	AI & Language Modeling	3
Total Credits		12

Industrial Engineering and Management Major

Major Requirements

Degree Type: B.S.I.E.Mgt.
Minimum Credits Required: 130

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	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	4
CHEM 122	General Chemistry II	3
ENGL 321	Writing in the Technical Professions	3
ENGR 327	Ethics, Engineering, and Technology	3
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	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 397	Fe/Coop Ed/Internship	
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

- 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. A substitution form signed by the department chairperson will also need to be submitted to the Office of Registration and Records for official substitution into the student's progress toward degree.
- 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 or ACCT 102	Elements of Accounting I and Elements of Accounting II Fundamentals of Accounting	3 or 6
ECON 201 & ECON 202 or ECON 105	Principles of Microeconomics and Principles of Macroeconomics Elements of Economics	3 or 6
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.

Industrial Engineering and Management Minor

Minor Requirements

Minimum Credits Required: 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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Core 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	Cybersecurity 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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 122

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
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	3
ID 316	History of Interiors II	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:		16
Apparel, Retail Merchandising and Design		
Art		
Business Administration		
Disaster Resilience and Emergency Management		
Entrepreneurship		
Gerontology		
History		
Human Development and Family Science		
Landscape Architecture		
Natural Resources Management		
Professional Selling		
Psychology		
Spanish		
Strategic Communication		
Other minor options may be approved by the interior design faculty.		

Total Credits**83**

Degree Requirements and Notes

- A minimum grade of C is required for all major core requirements.
- Students must maintain a 3.00 cumulative GPA to remain in the program.
- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

- Note about the Minor Credits: Total credits required to complete will vary based on minor selected. If minor credit requirements are met but total credits for major are not complete, student will have to take additional elective courses to meet the minimum credits for a degree.

Journalism Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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

Journalism Minor

Minor Requirements

Minimum Credits Required: 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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 130

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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:**

- This major is intended for students who plan to continue and complete the Master of Landscape Architecture Degree.

Landscape Architecture Minor

Minor Requirements

Minimum Credits Required: 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 Minor

Minor Requirements

Minimum Credits Required: 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 360	Equine Nutrition	
ANSC 393	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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 or ECON 202	Principles of Microeconomics Principles of Macroeconomics	3
ENGL 120	College Composition II	3
MATH 144	Mathematics for Business	4
PSYC 111 or SOC 110	Introduction to Psychology Introduction to Sociology	3
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:		
BUSN 430	Legal and Social Environment of Business ²	3
BUSN 489	Strategic Management (Capstone Course) ²	3
FIN 320	Principles of Finance ²	3
MGMT 320	Foundations of Management ²	3
MGMT 330	Foundations of Organizational Behavior	3
MGMT 380	People Analytics	3
MGMT 430	Leadership in Organizations	3
MGMT 450	Human Resource Management	3
MGMT 451	Negotiations	3
MIS 320	Management Information Systems ²	3
MRKT 320	Foundations of Marketing ²	3
Management 300-400 Elective Courses ³		
A. Select 300-400 level courses from current MGMT prefix courses.		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 or SCM 460.		6
At least one of the following international courses must be taken and will count in one of the management 300-400 level elective areas (A or B):		
BUSN 340	International Business	
BUSN 341	Global Business Environment	
ENTR 440	International Entrepreneurship	
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.

³ At least one of the following international courses must be included in the plan of study and can count in one of the management 300-400 level elective areas (A or B):

- 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

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 required for degree completion, with a minimum grade of C. Business courses are defined as courses with the following prefixes: ACCT, BUSN, ENTR, FIN, MGMT, FIN, MRKT, or SCM. 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. All transfer courses are subject to approval by the course discipline chair or designated representative.

- 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, with the exception of BUSN 413 when it is appropriately applied to a declared track.
- 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, unless taken as BUSN 413 and applied toward the completion of an approved track.
- Student may choose to declare a track other than the standard 300-400 Management Elective track. Other tracks include Human Resource Management Track, Supply Chain Management Track, or Event Management Track. Declaration of these tracks require a major change form to Registration and Records.

Human Resources Management Track

Code	Title	Credits
Required Courses		
MGMT 452	Compensation Management	3
MGMT 454	Labor-Management Relations	3
MGMT 453	Understanding and Managing Diversity in Organizations	3
Select one of the following:		3
BUSN 383	Organizational Communication I	
BUSN 413	Business Internship ⁴	
MGMT 470	Entrepreneurship/Small Business Management	
MGMT 471	Leading Social Entrepreneurship and Nonprofit Organizations	
MGMT 472	Managing Family Enterprises	
PSYC 457	Managing Work Motivation and Morale	
Total Credits		12

Supply Chain Management Track

Code	Title	Credits
Required Courses		
SCM 320	Integrated Supply Chain Management	3
SCM 460	Production & Operations Management	3
Select two of the following:		6
AGEC 378	Introduction to Transportation & Logistics	
BUSN 413	Business Internship ⁴	
MRKT 362	Foundations of Retailing	
MRKT 430	Sales and Personal Selling	
MRKT 438	Customer Relationship Management (CRM) and Sales Technology	
MRKT 460	Marketing Strategy	
Total Credits		12

Event Management Track

Code	Title	Credits
Required Courses		
MGMT 241	Event Management	3
MGMT 441	Events Experience and Planning	3
Select two of the following:		6
BUSN 413	Business Internship ⁴	
MRKT 420	Advertising and Integrated Marketing Communication	
MRKT 430	Sales and Personal Selling	

MRKT 470	Services Marketing
Total Credits	
12	

- ⁴ BUSN 413 is only eligible to apply to program requirements for students who have declared one of the approved MGMT Tracks. Internship must be approved by the Department. Maximum of 3 credits.

Management Communication Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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

Management Communication Minor

Minor Requirements

Minimum Credits Required: 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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student’s declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Pre-Major Requirements		
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	
Major 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
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.		24-26
Total Credits		96-98

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	
Technology 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).		6
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	
GLBL 492	Global Practicum: Study Abroad

Total Credits **24-26**

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).		9
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	
GLBL 492	Global Practicum: Study Abroad	

Total Credits **24-25**

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.

Management Information Systems Minor

Minor Requirements

Minimum Credits Required: 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.

Manufacturing Engineering Major

Major Requirements

Degree Type: B.S.Mfg.E.
Minimum Credits Required: 129

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).

6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	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 & 331L	Materials Science and Engineering and Materials Science and Engineering Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122	General Chemistry II	3
ENGL 321	Writing in the Technical Professions	3
ENGR 327	Ethics, Engineering, and Technology	3
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	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 397	Fe/Coop Ed/Internship
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

- 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.

Manufacturing Engineering Minor

Minor Requirements

Minimum Credits Required: 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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		

Category L: Digital Literacy

Total Credits**39****Major Requirements**

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 with this major.

Code	Title	Credits
Pre-Major Requirements		
COMM 110	Fundamentals of Public Speaking	3
ECON 201 or ECON 202	Principles of Microeconomics ¹ Principles of Macroeconomics	3
ENGL 120	College Composition II	3
MATH 144	Mathematics for Business	4
PSYC 111 or SOC 110	Introduction to Psychology ¹ Introduction to Sociology	3
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 or ECON 202	Principles of Microeconomics ¹ Principles of Macroeconomics	3
PSYC 111 or SOC 110	Introduction to Psychology ¹ Introduction to Sociology	3
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
MRKT 465	Digital Marketing	3
Marketing Elective Courses ³		
A. Select 300-400 level courses from current MRKT prefix courses.		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 and SCM 460.		6
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
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.

³ At least one of the following courses must be included in the plan of study in one of the marketing 300-400 level elective areas (A, B, or C):

- BUSN 340 International Business
- BUSN 341 Global Business Environment
- ENTR 440 International Entrepreneurship
- FIN 440 International Finance
- MRKT 440 International Marketing

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 courses¹ required for degree completion, with a minimum grade of C². 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 460	Production & Operations Management	3
Select two 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	

Total Credits **9**

Mathematics and Physics Dual Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 122

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	Classical Mechanics (or PHY 330: Intermediate Mechanics at MSUM)	3

PHYS 361	Electromagnetic Theory (or PHY 370: Electromagnetic Theory at MSUM)	3
PHYS 485	Quantum Mechanics I	3
PHYS 488	Senior Project I	1
PHYS 489	Senior Project II	2
Physics Electives: Select 5 of the following:		15
PHYS 215	Research For Undergraduates	
PHYS 360	Modern Physics II	
PHYS 370	Introduction to Computational Physics	
PHYS 411	Optics for Scientists & Engineers	
PHYS 413	Lasers for Scientists and Engineers	
PHYS 415	Elements of Photonics	
PHYS 430	Quantum Computation	
PHYS 462	Thermal and Statistical Physics	
PHYS 481	Materials Physics	
PHYS 486	Quantum Mechanics II	
MSUM AST	Astronomy courses (300/400-level) with departmental permission	
Related Required Courses		
Computer Science:		
CSCI 160	Computer Science I	4
Chemistry: Select one of the following (150/160 recommended):		4
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
Select one of the following (151/161 recommended):		4
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	

Total Credits**88**

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Mathematics and Statistics Dual Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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

Mathematics and Statistics Pre-Actuarial Major

Major Requirements

Degree Type: B.S./B.A.
Minimum Required Credits: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	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	3
ECON 202	Principles of Macroeconomics	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.

Mathematics Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

major requirements

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.

Mathematics Minor

Minor Requirements

Minimum Credits Required: 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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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.

Meat Science Certificate

Certificate Requirements

Minimum Credits Required: 9

Code	Title	Credits
Required		
ANSC 240	Meat Animal Evaluation and Marketing	3
ANSC 340	Principles of Meat Science	3
Choose one from the following:		3-4
ANSC 230 & ANSC 330	Meat Grading and Evaluation and Competitive Meat Grading and Evaluation	

ANSC 444

Livestock Muscle Physiology

Total Credits**9-10**

Mechanical Engineering Major

Major Requirements

Degree Type: B.S.M.E.
Minimum Credits Required: 130

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	3
ME 331L	Materials Science and Engineering Laboratory	1
ME 351	Thermodynamics I	3
ME 352	Fluid Dynamics	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 460	Product Design and Development	3
ME 461	Design Project I	3
ME 462	Design Project II	3
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
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	3
IME 330	Manufacturing Processes	3
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
Technical Electives: Select 15 credits from the following:		15
ME 332	Engineering Materials II	
ME 435 or IME 635	Plastics and Polymer Processing in Manufacturing 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 or ABEN 479	Fluid Power Systems Design Fluid Power Systems Design	
ME 480	Biofluid Mechanics	
ME 481	Fundamentals of Energy Conversion	
ME 482	Fuel Cell Science and Engineering	
ME 483	Introduction to Computational Fluid Dynamics	
ME 484	Aerospace Propulsion	
ME 485	Heating, Ventilation and Air Conditioning	
ME 486 or CE 686	Nanotechnology and Nanomaterials Nanotechnology and Nanomaterials	
ME 487	Internal Combustion Engines	
ME 488	Introduction to Aerodynamics	
ME 489	Vehicle Dynamics	
Approved technical electives from other departments - no more than 3 courses from the following:		
ABEN 456	Biobased Energy	
CPM 473	Polymer Synthesis	

CPM 474	Applied Polymer Science
CPM 475	Coatings' Materials Science
CPM 486	Corrosion and Materials
CSCI 485	Artificial Intelligence for Robots and Cyber-Physical Systems
ECE 461	Control Systems I
ECE 463	Modern Control
ECE 485	Biomedical Engineering
ECE 487	Cardiovascular Engineering
ECE 488	Cardiovascular Engineering II
ENGR 410	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	Classical Mechanics
PHYS 361	Electromagnetic Theory
PHYS 485	Quantum Mechanics I

Total Credits**110**

* Students who have completed ABEN 110, CE 111, CM&E 111, ECE 111, IME 111 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 Major program (Junior/Senior years) 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 Dual Major

Major Requirements

Degree Type: B.S.M.E.
Minimum Credits Required: 136

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).

6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	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
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	3
ME 331L	Materials Science and Engineering Laboratory	1
ME 352	Fluid Dynamics	3
ME 351	Thermodynamics I	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 460	Product Design and Development	3
ME 461	Design Project I	3
ME 462	Design Project II	3
PHYS 171	Introductory Projects in Physics	1

PHYS 252	University Physics II	4
PHYS 252L	University Physics II Laboratory	1
PHYS 350	Modern Physics	3
PHYS 355	Classical Mechanics	3
PHYS 361	Electromagnetic Theory	3
PHYS 411	Optics for Scientists & Engineers	3
PHYS 411L	Optics for Scientists and Engineers Lab	1
PHYS 485	Quantum Mechanics I	3
PHYS Elective		3
Total Credits		116

* Students who have completed ABEN 110, CM&E 111, CE 111, IME 111, ECE 111 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 Engineering GPA and a minimum 2.50 cumulative GPA by the end of the sophomore year of the curriculum.
- A 2.50 cumulative GPA is required for graduation.

Medical Laboratory Science Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Medical Laboratory Science Major Requirements		
ASCI 190	Critical Thinking, Academic, and Professional Skills for the Health Professions	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 Foundations of Biochemistry I Laboratory	4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151	General Biology II	3
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	4
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
CSCI 114 or TL 116	Computer Applications Business Software Applications	3
MATH 103	College Algebra (or higher level; excluding MATH 104)	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 463	Clinical Parasitology	2
MICR 460 & 460L	Microbial Pathogenesis and Microbial Pathogenesis Laboratory	5
MICR 470	Basic Immunology	3
MICR 471	Immunology and Serology Laboratory	2
STAT 330	Introductory Statistics	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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
MICR 189	^{1,2}	1
MICR 350 & 350L	General Microbiology and General Microbiology Lab ²	5
MICR 352	The Science Toolkit: Skills for Scientific Success ²	3
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
Required Capstone Experience - Select one course experience of the following: ²		2
MICR 493		
MICR 494		
MICR 497		
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3

BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 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
ENGL 324 or ENGL 325	Writing in the Sciences Writing in the Health Professions	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	

Subplan

Select either the Standard Microbiology subplan or the Biomedical Sciences subplan to complete the major requirements. 15

Total Credits 96-97

Standard Subplan

Code	Title	Credits
Select a minimum of 12 credits from the following course list.		12
MICR 379 or MICR 492	(with prior approval) ²	
MICR 394	(no more than 3 credits) ²	
MICR 453	Food Microbiology ^{2,3}	
MICR 454	Biotechnology for Sustainability ^{2,3}	
MICR 455	Microbial Biotechnology ^{2,3}	
MICR 456	Human Microbiome ^{2,3}	
MICR 457	Microbiomes: Agriculture and Environmental Resilience ^{2,3}	
MICR 458	Animal Health and Antimicrobial Resistance (AMR) ^{2,3}	
MICR 460	Microbial Pathogenesis ^{2,3}	
MICR 481	Microbial Genomics with Computational Laboratory ^{2,3}	
MICR 491	((1-3 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 401	Science Communication ^{2,3}	
PLSC 307	History and Evolution of Wine in America ²	
PLSC 431	Intermediate Genetics ^{2,3}	
PPTH 424	Fundamental Plant Pathology	
PPTH 435	Principles of Plant Disease Management	
PPTH 437	Practices of Plant Disease Management Research	
PPTH 447	Fundamentals of Molecular Techniques in Agriculture	
PPTH 460	Fungal Biology ^{2,3}	
SOIL 351	Soil Ecology ²	
Laboratory Courses - Select at least 3 credits from the following: ²		3
MICR 445	Animal Cell Culture Techniques ^{2,3}	
MICR 453L	Food Microbiology Laboratory ^{2,3}	
MICR 460L	Microbial Pathogenesis Laboratory ^{2,3}	
MICR 471	Immunology and Serology Laboratory ^{2,3}	
BIOC 474	Methods of Recombinant DNA Technology ^{2,3}	
PPTH 424L	Fundamental Plant Pathology Laboratory	
PPTH 448	Plant Disease Diagnostics and Quantification	

Total Credits**15**

Biomedical Sciences Subplan

Code	Title	Credits
MICR 460	Microbial Pathogenesis ^{2,3}	3
MICR 460L	Microbial Pathogenesis Laboratory ^{2,3}	2
Select a minimum of 10 credits from the following: ²		10
ANSC 218	Anatomy and Physiology of Domestic Animals	
ANSC 219	Anatomy and Physiology Laboratory	
ANSC 300	Domestic Animal Behavior and Management	
ANSC 370	Fundamentals/Animal Disease	
ANSC 371	Fundamentals of Animal Disease 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	
BIOL 401	Science Communication ³	
BIOL 483	Cellular Mechanisms of Diseases ³	
MLS 435	Hematology	
MICR 456	Human Microbiome ³	
MICR 458	Animal Health and Antimicrobial Resistance (AMR) ³	
MICR 477	Vaccinology ³	
PH 474	Epidemiology	

Total Credits**15**

¹ MICR189 is required for new students to our programs - This includes: first-time, first-year student and transfer students into the university. Students who change their major are not required to take MICR 189, but can elect to.

² 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>).

Microbiology Minor

Minor Requirements

Minimum Credits Required: 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	The Science Toolkit: Skills for Scientific Success	
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	
MICR 475	Virology	
MICR 480	Microbial Physiology	
MICR 481	Microbial Genomics with Computational Laboratory	
MICR 482	Microbial Genetics	
MICR 491	Seminar (Seminar in Microbiology) ¹	
MICR 493	Undergraduate Research ¹	
MICR 494	Individual Study (Teaching Experience in Microbiology) ¹	
MICR 496	Field Experience (Field Experience in Microbiology) ¹	
MICR 497	FE/Coop Ed/Internship (Internship in Microbiology) ¹	
PH 474	Epidemiology	
Total Credits		16

¹ 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 Minor

Minor Requirements

Minimum Credits Required: 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 Major (B.S.)

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 122

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	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: Select from following: ²		1
MUSC 380	Recital	
MUSC 480	Recital	
MUSC 494	Individual Study	
Vocal Music or Instrumental Music Track		
Select either the vocal or instrumental track to complete the major.		12 or 22
Total Credits		42-52

Instrumental Music Track (Default Track)

Code	Title	Credits
Applied Music: Select 6 credits from the following:		6
MUSC 165	Applied Piano	
MUSC 168	Applied Wind Instruments	
MUSC 169	Applied Percussion Instruments	
MUSC 170	Applied Upper Strings	
MUSC 171	Applied Lower Strings	
MUSC 172	Applied Guitar	
MUSC 265	Applied Piano	
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 365	Applied Piano	
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 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 303	Wind Symphony	
MUSC 304	University Symphony Orchestra	
Total Credits		12

Vocal Music Track

Code	Title	Credits
Vocal Music Core		
MUSC 108	Roots of American Popular Music	3
MUSC 109	World Music	3
MUSC 160	Piano Class I	1
MUSC 161	Piano Class II	1
MUSC 174	Pronunciation for Singers I	1
MUSC 175	Pronunciation for Singers II	1
Applied Music: Select 6 credits from the following:		6
MUSC 167	Applied Voice	
MUSC 267	Applied Voice	
MUSC 367	Applied Voice	
MUSC 373	Supplementary Applied Study	
MUSC 467	Applied Voice	
MUSC 473	Supplementary Applied Study	

Major Ensemble: Select 6 credits from the following:

6

MUSC 116	Cantemus
MUSC 117	Statesmen of NDSU
MUSC 215	University Chamber Singers
MUSC 306	Concert Choir

Total Credits**22**

- 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.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.

Music Minor

Minor Requirements

Minimum Credits Required: 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 - Composition Major (B.Mus.)

Major Requirements

Degree Type: B.Mus.
Minimum Credits Required: 123

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	
Applied Composition		
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		
MUSC 435	Topics in Music Theory (must be taken two times)	6
Major Electives		
Selected in consultation with Advisor ²		10
Total Credits		84

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 Courses selected in consultation with an advisor will require a substitution form to be submitted to the Office of Registration and Records for degree progress inclusion.

Music - Instrumental Performance Major (B.Mus.)

Major Requirements

Degree Type: B.Mus.
Minimum Credits Required: 128

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		

Category L: Digital Literacy

Total Credits**39****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 331	Instrumental Arranging	2
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 344	Wind Band Literature	2
or MUSC 441	Symphonic Literature	
MUSC 380	Recital	1
MUSC 351	Instrumental Conducting & Literature	2
MUSC 385	Music Entrepreneurship	3
MUSC 480	Recital	1
Advanced Theory		
MUSC 435	Topics in Music Theory (must be taken two times)	6
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
Applied Piano: Class or individual study	
Select 4 credits from the following:	
MUSC 160 or MUSC 165	Piano Class I (Up to 2 semesters of MUSC 165 with permission) Applied Piano
MUSC 161	Piano Class II
MUSC 260	Piano Class III
MUSC 261	Piano Class IV
Jazz Studies	
Select 4 credits from the following:	
MUSC 311	Jazz Ensemble
MUSC 357	Marching Band Methods and Techniques
MUSC 364	Jazz Improvisation
MUSC 166	Applied Composition
MUSC 266	Applied Composition
Major Ensemble	
Select 8 credits from the following:	
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:	
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 ²	

Total Credits **89**

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

² Courses approved by advisor will require a substitution form to be submitted to the Office of Registration and Records for degree progress inclusion.

Degree Notes

- Music majors may not declare a music minor.

Music - Piano Performance Major (B.Mus.)

Major Requirements

Degree Type: B.Mus.
Minimum Credits Required: 128

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	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		
MUSC 435	Topics in Music Theory (Take course three times)	9
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 course two times)	6
Additional Literature: Select one course from the following:		2-3
MUSC 344	Wind Band Literature	
MUSC 446	Topics in Song 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		89-90

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

Degree Notes

- Music majors may not declare a music minor.

Music - Vocal Performance Major (B.Mus.)

Major Requirements

Degree Type: B.Mus.
Minimum Credits Required: 142

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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
MUSC 435	Topics in Music Theory (must be taken two times)	6
Applied Music		
Select 22 credits from the following:		22
MUSC 167 & MUSC 173	Applied Voice and Supplementary Applied Study ²	
MUSC 267 & MUSC 273	Applied Voice and Supplementary Applied Study ²	
MUSC 367 & MUSC 373	Applied Voice and Supplementary Applied Study ²	
MUSC 467 & MUSC 473	Applied Voice and Supplementary Applied Study ²	
Vocal Track		
MUSC 174	Pronunciation for Singers I	1
MUSC 175	Pronunciation for Singers II	1
MUSC 349	Vocal Methods & Pedagogy I	2
MUSC 446	Topics in Song Literature	3
MUSC 442	Opera Literature	3
Language		
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
Applied Piano		
Student may take up to two semesters of private MUSC 165 or the four course sequence		
MUSC 160 & MUSC 161 & MUSC 260 & MUSC 261 or MUSC 165	Piano Class I and Piano Class II and Piano Class III and Piano Class IV Applied Piano	4
Major Ensemble		
Select 8 credits from the following:		8
MUSC 306	Concert Choir (or as approved by adviser) ³	
Minor Ensemble		
Select 4 credits from the following or as approved by the advisor: ³		4
MUSC 215	University Chamber Singers	
MUSC 317	Madrigal Singers	
MUSC 319	Opera Workshop	
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.

³ Requires a substitution form to be submitted to Registration and Records for degree tracking purposes.

Degree Notes

- Music majors may not declare a music minor.

Music Education Instrumental Major (B.Mus.)

Major Requirements

Degree Type: B.Mus.
Minimum Credits Required: 143

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student’s declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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.

Music Education Vocal Major (B.Mus.)

Major Requirements

Degree Type: B.Mus.
Minimum Credits Required: 151

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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	
Category L: Digital Literacy	
Total Credits	39

Major Requirements

Code	Title	Credits
Music Core Requirements for Education Majors		
PSYC 111	Introduction to Psychology	3
HDFS 230 or PSYC 250	Life Span Development Developmental Psychology	3
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 or MUSC 480	Recital Recital	1
MUSC 385	Music Entrepreneurship	3
MUSC 481	Instrumental Music Methods	2
MUSC 482	Choral Music Methods	2
MUSC 483	Elementary Music Methods	2
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Vocal Track Requirements		
Major Choral Ensemble: Must be taken in 7 different semesters. Select from the following in consultation with adviser.		7
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	

MUSC 306	Concert Choir	
Minor Choral/Vocal Ensemble: Must be taken in 2 different semesters. Select two credits from the following in consultation with adviser:		2
MUSC 215	University Chamber Singers	
MUSC 317	Madrigal Singers	
MUSC 319	Opera Workshop	
Major Instrumental Ensemble: Must be taken in 2 different semesters. Select two credits from the following in consultation with adviser:		2
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 303	Wind Symphony	
MUSC 304	University Symphony Orchestra	
MUSC 311	Jazz Ensemble	
Applied Voice: Must enroll in the following as indicated:		7
MUSC 167	Applied Voice (for 2 semesters)	
MUSC 267	Applied Voice (for 2 semesters)	
MUSC 367	Applied Voice (for 2 semesters)	
MUSC 467	Applied Voice (for 1 semester)	
Students enrolled in applied instruction must participate in a major ensemble specific to applied area.		
Applied Piano: Private (MUSC 165) or class (MUSC 160; MUSC 161; MUSC 260; MUSC 261)		4
MUSC 160	Piano Class I (Up to 2 semesters of MUSC 165 with permission)	
or MUSC 165	Applied Piano	
MUSC 161	Piano Class II	
MUSC 260	Piano Class III	
MUSC 261	Piano Class IV	
Total Credits		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.

Music Education Minor

Minor Requirements

Minimum Credits Required: 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.

Music Education Instrumental Minor

Minor Requirements

Minimum Credits Required: 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 Ensemble: Select 2 credits from the following:		2
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 303	Wind Symphony	
Music Education Methods		
MUSC 353	Woodwind Methods I	2
MUSC 355	Brass Methods	2
MUSC 359	Percussion Methods	2
Music Education Practicum		
MUSC 481	Instrumental Music Methods	2
Total Credits		23

Music Education Vocal Minor

Minor Requirements

Minimum Credits Required: 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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

MAJOR REQUIREMENTS

Code	Title	Credits
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	4
ECON 201	Principles of Microeconomics	3
ENGL 321 or ENGL 324 or ENGL 459	Writing in the Technical Professions Writing in the Sciences Researching and Writing Grants and Proposal	3
ENT 210	Insects, Humans and the Environment	3
PHIL 215 or PHIL 225	Contemporary Moral Issues Environmental Ethics	3
MATH 103	College Algebra	3
NRM 150	Natural Resource Management Orientation	1
NRM 225	Natural Resources & Agrosystems	3
NRM 421	Environmental Outreach Methods	3
NRM/RNG/SOIL 462	Natural Resource and Rangeland Planning	3
RNG 136	Introduction to Range Management	3
RNG 213	Rangeland Sampling Techniques	3
RNG 452	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 or BIOL 476	Conservation Biology Wildlife Ecology and Management	3
ECON 481	Natural Resource Economics	3
NRM 264	Natural Resource Management Systems	3
NRM 402 or NRM 454 or SOIL 410	River and Stream Resource Management Wetland Resources Management Soils and Land Use	3
NRM 431	National Environmental Policy Act 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 Taxonomy	
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	Fire Ecology and Rangeland Management
RNG 456	Ecological Restoration
RNG 458	Grazing Ecology and Rangeland Management
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	
DREM 101	Emergencies, Disasters, and Catastrophes	
DREM 381	Disasters Through A Systems Lens	
DREM 361	Disaster Preparedness	
DREM 362	Disaster Mitigation	
DREM 363	Disaster Response	
DREM 410	Comprehensive Emergency Management Planning	
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	Fire Ecology and Rangeland Management
RNG 456	Ecological Restoration
RNG 458	Grazing Ecology and Rangeland Management
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 and 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	Fire Ecology and Rangeland Management	3
RNG 456	Ecological Restoration	3
RNG 458	Grazing Ecology and Rangeland Management	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	3
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 and Rangeland Management	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		48

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 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.

Natural Resources Management Minor

Minor Requirements

Minimum Credits Required: 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	
DREM 361	Disaster Preparedness	
DREM 362	Disaster Mitigation	
ENT 350	General Entomology	
GEOL 105	Physical Geology	
GEOL 300	Environmental Geology	
HIST 434	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	Fire Ecology and Rangeland Management	
RNG 458	Grazing Ecology and Rangeland Management	
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 Minor

Minor Requirements

Minimum Credits Required: 17

Code	Title	Credits
Required Courses		
PSYC 260	Introduction to Neuroscience	3
Electives: Select 14 credits from the following:		14
BIOL 220	Human Anatomy and Physiology I	
BIOL 220L	Human Anatomy and Physiology I Laboratory	
PSYC 322	Judgment & Decision-Making	
PSYC 450	Computational Methods in Experimental Psychology	
PSYC 460	Sensation & Perception	
PSYC 461	Memory And Knowledge	
PSYC 464	Attention & Thinking	
PSYC 465	Psychobiology	
PSYC 481	Health Psychology	
PSYC 486	Neuropsychology	
PSYC 493	Undergraduate Research (no more than 6 credits)	
Total Credits		17

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Psychology Majors: Classes taken for the psychology major cannot be double-counted with the neuroscience minor. The credits must be unique from courses used to fulfill the psychology major.

Nursing Pre-Licensure Major

Major Requirements

Degree Type: B.S.N.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	Maternal Newborn Nursing	4
NURS 360	Health Assessment	4
NURS 362	Pediatric Nursing	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 463	Leadership and Interprofessional Health Care	4
PSYC 111	Introduction to Psychology ²	3
PSYC 250 or HDFS 230	Developmental Psychology Life Span Development	3
SOC 110	Introduction to Sociology ²	3

or ANTH 111

Introduction to Anthropology

Total Credits**99**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.

Nursing LPN to BSN Major**Major Requirements**

Degree Type: B.S.N.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	Maternal Newborn Nursing (validation)	4
NURS 360	Health Assessment	4
NURS 362	Pediatric Nursing (validation)	4
NURS 372	Expanded Family Nursing I	2
NURS 374	Expanded Family Nursing II	2
NURS 402	Mental Health Nursing (validation)	4
NURS 403	Adult Health Nursing II (validation)	5
NURS 405	Psychosocial Nursing	2
NURS 406	Community & Public Health Nursing	4
NURS 407	Adult Health: Complex Problems	3
NURS 407L	Expanded Clinical Practice for the LPN-BSN	3
NURS 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.

Nursing RN to BSN Major

Major Requirements

Degree Type: B.S.N.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Demonstrated Competency Credit (see notes below)		
Nursing Major Requirements		
NURS 356	The Essence of Nursing	4
NURS 366	Quality and Safety in Nursing	4
NURS 420	Evidence-Based Practice and Research in Nursing	3
NURS 446	Population Health Nursing	4
NURS 446L	Population Focused Nursing Care - Clinical	1
NURS 462	Nurses as Leaders	4
NURS 376	Challenges and Trends in Nursing	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	

Requirements and Degree Notes:

- Students must maintain a semester GPA of 2.0 or above for each semester in the College of Health and Human Sciences (CHHS). A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the CHHS.
- 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.

Nursing Post Baccalaureate Major

Major Requirements

Degree Type: B.S.N.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Students in the post-baccalaureate track have already completed a bachelor's degree.		
NURS 300	Pharmacology & Pathophysiology for Nursing	4
NURS 303	Introduction to the Nursing Profession	3
NURS 352	Maternal Newborn Nursing	4
NURS 362	Pediatric Nursing	4
NURS 463	Leadership and Interprofessional Health Care	4
NURS 323	Skills and Concepts of Clinical Nursing	5

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 II	6
NURS 450	Nursing Synthesis/Practicum	4
NURS 400	Comprehensive Adult Health I	6

Total Credits	55

Nutrition Science Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		

Total Credits	39

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
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 **67-86**

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.

Organizational Leadership Certificate

Certificate Requirements

Minimum Credits Required: 9

Code	Title	Credits
MGMT 430	Leadership in Organizations ¹	3
MGMT 434	Leading Virtual Teams ¹	3
MGMT 436	Ethical Leadership	3
Total Credits		9

¹ MGMT 320 Foundations of Management is a required prerequisite.

Pharmaceutical Sciences (Pre-Pharmacy) Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 127-136

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Pharmaceutical Sciences (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
PHRM 190	Critical Thinking, Academic, and Professional Skills for the Health Professions	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 or ENGL 325	Writing in the Sciences 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.

Pharmaceutical Sciences Minor

Major Requirements

Minimum Credits Required: 16

Code	Title	Credits
PSCI 368	Pharmaceutics I	3
PSCI 369	Pharmaceutics II	2
PSCI 410	Pharmaceutical Biotechnology	2
PSCI 411	Principles of Pharmacokinetics and Pharmacodynamics	3
Electives: Select 6 credits from the following:		6
PSCI 412	Chemotherapeutic/Infectious Disease Pharmacodynamics	
PSCI 413	Endocrine/Respiratory/GI Pharmacodynamics	
PSCI 417	Pharmacogenomics	
PSCI 470	Pharmacokinetics	
PSCI 494	(1-4 credits)	
Total Credits		16

Pharmacy Major

Major Requirements

Degree Type: Pharm.D.

Minimum Credits Required: 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	4
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
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 ¹		6
P4 Fourth Year Professional		
Essentials for Pharmacist Licensure I-III		
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

¹ 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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

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.

Philosophy, Ethics, and Applied Humanities Minor

Minor Requirements

Minimum Credits Required: 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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).

6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	Methods Of Coaching	3
HPER 367	Pedagogy of the Body for K-12	3
PSYC 111	Introduction to Psychology	3
Major Option		
Students select either the K-12 Teaching Licensure Option or the Coaching & Physical Activity Leadership Option		51 or 54
Total Credits		73-76

K-12 Teacher Licensure Option

Code	Title	Credits
HDFS 230 or PSYC 250	Life Span Development ² Developmental Psychology	3
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 Marketing 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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
PHYS 350	Modern Physics	3
PHYS 355	Classical Mechanics	3
PHYS 361	Electromagnetic Theory (or PHY 370: Electromagnetic Theory from MSUM)	3
PHYS 485	Quantum Mechanics I	3
PHYS 488	Senior Project I	1
PHYS 489	Senior Project II	2
CSCI 160 or ECE 173	Computer Science I Introduction to Computing	4
MATH 129 or MATH 329	Basic Linear Algebra Intermediate 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 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 outlined below). 19-20

Total Credits 81-82

Standard Option

Code	Title	Credits
CSCI 161	Computer Science II	4
Physics Electives: Select 15 credits from the following:		15
PHYS 215	Research For Undergraduates	
PHYS 360	Modern Physics II	
PHYS 370	Introduction to Computational Physics	
PHYS 411	Optics for Scientists & Engineers	
PHYS 411L	Optics for Scientists and Engineers Lab	
PHYS 413	Lasers for Scientists and Engineers	
PHYS 415	Elements of Photonics	
PHYS 430	Quantum Computation	
PHYS 486	Quantum Mechanics II	
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 19

Optical Science and Engineering Option

Code	Title	Credits
PHYS 411	Optics for Scientists & Engineers	3
PHYS 411L	Optics for Scientists and Engineers Lab	1
PHYS 413	Lasers for Scientists and Engineers	3
PHYS 415	Elements of Photonics	3
EE 206	Circuit Analysis I	4
Physics Electives: Select 6 credits from the following		6
PHYS 215	Research For Undergraduates	
PHYS 360	Modern Physics II	
PHYS 370	Introduction to Computational Physics	
PHYS 430	Quantum Computation	
PHYS 462	Thermal and Statistical Physics	

PHYS 481	Materials Physics	
PHYS 486	Quantum Mechanics II	
Total Credits		20

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Physics Minor

Minor Requirements

Minimum Credits Required: 16

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 4 credits from the following:		4
PHYS 171	Introductory Projects in Physics	
PHYS 251L	University Physics I Laboratory	
PHYS 215	Research For Undergraduates	
PHYS 430	Quantum Computation	
Any 300-400 level Physics course		
Total Credits		16

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- ME 221 and ME 222 may be substituted for PHYS 251 and PHYS 251L.

Physics Education Major

Major Requirements

Degree Type: B.A. or B.S.
 Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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	
Category L: Digital Literacy	
Total Credits	39

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	Classical Mechanics (or PHYS 330: Intermediate Mechanics (MSUM))	3
PHYS 361	Electromagnetic Theory (or PHYS370: Electromagnetic Theory (MSUM))	3
PHYS 411 & 411L	Optics for Scientists & Engineers and Optics for Scientists and Engineers Lab	4
PHYS 462	Thermal and Statistical Physics	3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3

EDUC 481	Classroom Practice Methods of Teaching I: (Science)	3
EDUC 482	Classroom Practice/Methods of Teaching II: (Science)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3

Total Credits**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 Major**Major Requirements**

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		

Total Credits**39**

Major Requirements

Code	Title	Credits
Core Requirements		
POLS 110 or POLS 115	Introduction to Political Science American Government	3
POLS 220 or POLS 225	International Politics Comparative Politics	3
POLS 240	Political Ideologies	3
POLS 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

Political Science Minor

Minor Requirements

Minimum Credits Required: 21

Code	Title	Credits
Required Courses		
POLS 110 or POLS 115	Introduction to Political Science American Government	3
POLS 220 or POLS 225	International Politics Comparative Politics	3
POLS 240	Political Ideologies	3
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 Minor

Minor Requirements

Minimum Credits Required: 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
NRM 452	Managing Natural and Rangeland Resources using GIS	3
Elective Courses - Select 6 credits from the following:		6
ABEN 358	Electric Energy Application in Agriculture	
ABEN 377	Finite Element Analysis 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 105	Fundamentals of Geographic Information Systems
GEOG 455	Introduction to Geographic Information Systems
GEOG 456	Advanced Geographic Information Systems
GEOG 470	Remote Sensing
GEOG 480	Geographic Information Systems Pattern Analysis and Modeling
ME 311	Introduction To Aviation
ME 312	Introduction to Flight
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 Minor

Minor Requirements

Minimum Credits Required: 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 Certificate

Certificate Requirements

Minimum Credits Required: 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 Minor

Minor Requirements

Minimum Credits Required: 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 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 Ethics Certificate

Certificate Requirements

Minimum Credits Required: 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 470	Social and Political Philosophy	
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 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 Minor

Minor Requirements

Minimum Credits Required: 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 for MRKT 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 Selling Certificate

Certificate Requirements

Minimum Credits Required: 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.

Professional Writing Certificate

Certificate Requirements

Minimum Credits Required: 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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.

3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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.

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. 14
Courses selected for this track cannot count for general education.

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 301	Rhetorical Traditions	
COMM 435	Critical Approaches to Popular Culture	
COMM 450	Issues in Communication	
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 725	Promoting Health through Policy, System and Environment	3

Total Credits **12**

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.

Psychology Minor

Minor Requirements

Minimum Credits Required: 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 Minor

Minor Requirements

Minimum Credits Required: 20

Code	Title	Credits
Minor Requirements		
PH 101	Introduction to Public Health	3
PH 432	Cultural Competence for Health Professionals	3
PH 474	Epidemiology	3
PH 475	One Health	2
STAT 330	Introductory Statistics	3
Electives: Select 6 credits from the following:		6
ANTH 332	Medical Anthropology	
BIOL/COMM 401	Science Communication	
DREM 101	Emergencies, Disasters, and Catastrophes	
DREM 345	Understanding Vulnerable Populations in Disasters	
HNES 250	Nutrition Science	
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	
MICR 350	General Microbiology	
PH 461	Injury Prevention	
PH 462	Global Health	
PH 465	Women's Health	
POLS 215	Problems and Policies In American Government	
SOC 431	Environmental Sociology	
Total Credits		20

Public History Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 404	Digital History	3
HIST 415	Public Memory and Memorialization in America	3
HIST 438	Historical Archaeology	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 240	"Cults" and New Religious Movements	
RELS 345	Church and State in America	
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 328	War and Society in America	
HIST 431	The North American Plains	
HIST 434	Environmental History	
HIST 436	American Frontier to 1850	
Non U.S. History: Select 6 credits from the following:		6
HIST 320	History of Christianity	
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 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 Minor

Minor Requirements

Minimum Credits Required: 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	
DREM 101	Emergencies, Disasters, and Catastrophes	
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 Certificate

Certificate Requirements

Minimum Credits Required: 12

Code	Title	Credits
PUB 472	Introduction to Publishing	3
PUB 476	Practicum in Publishing	3
PUB 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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Radiologic Sciences Major Requirements		
ASCI 190	Critical Thinking, Academic, and Professional Skills for the Health Professions	3
RS 200	Introduction to Radiologic Sciences	1
RS 496		60
Internship	Professional education (internship) within an accredited affiliated school of radiologic technology includes the capstone experience.	
BIOC 260 or BIOC 460	Elements of Biochemistry Foundations of Biochemistry and Molecular Biology I	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	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 or TL 116	Computer Applications Business Software Applications	3
MATH 105	Trigonometry (or higher level)	3
ASCI 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 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 Minor

Minor Requirements

Minimum Credits Required: 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
RNG 456	Ecological Restoration	3
or RNG 458	Grazing Ecology and Rangeland Management	
Select one of the following:		3
RNG 452	Managing Natural and Rangeland Resources using GIS	
RNG 453	Rangeland Resources Watershed Management	
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 Minor

Minor Requirements

Minimum Credits Required: 18

Code	Title	Credits
BUSN 431	Business Law I-Contracts, Property and Torts	3
BUSN 347	Principles of Real Estate	3
or AGECE 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
AGECE 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 Minor

Minor Requirements

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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Respiratory Care Major Requirements		
ASCI 190	Critical Thinking, Academic, and Professional Skills for the Health Professions	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 or BIOC 460	Elements of Biochemistry * Foundations of Biochemistry and Molecular Biology I	3 or 4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory *	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory *	4
ASCI 125	Medical Terminology for Health Professionals	1
PHRM 170	Common Diseases, Prevention, and Treatment	2
CSCI 114 or TL 116	Computer Applications Business Software Applications	3
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 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab *	
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 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 placement in the major program. Selection of hospital placements is selective. Please consult your Respiratory Care advisor for more information.

Robotics Minor

Minor Requirements

Minimum Credits Required: 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	Artificial Intelligence for Robots and 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	Artificial Intelligence for Robots and 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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

- Minimum of 120 semester credits (some programs may exceed this minimum).
- Complete the University General Education requirements.
- Minimum institutional GPA of 2.00 based on work taken at NDSU.
- Minimum of 30 credits in resident at NDSU.
- Minimum of 36 upper level credits (courses numbered 300 or higher).
- Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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

Category L: Digital Literacy

Total Credits**39****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 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		91

* 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 Dual Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 127

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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
or PHIL 215	Contemporary Moral Issues	
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 or 215, 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 HDFS prefix major courses and the HDFS courses required for the 9 credit option.
- Course taken *Pass/Fail* cannot be used to satisfy any requirements other than total credits.

Sociology Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student’s declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Sociology Core Requirements		
ANTH 111 or ANTH 206	Introduction to Anthropology * Introduction to Cultural Anthropology: Peoples of the World	3
SOC 110 or SOC 115 or SOC 116	Introduction to Sociology * Social Problems Global Social Problems	3
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.

Sociology Minor

Minor Requirements

Minimum Credits Required: 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).

Software Development Certificate

Certificate Requirements

Minimum Credits Required: 9

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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major 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
ECE 479	Formal Verification	3
EE 206	Circuit Analysis I	4
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 213	Modern Software Development	3
CSCI 222	Discrete Mathematics	3
CSCI 305	Principles of Cybersecurity	3
CSCI 313	Software Development with Frameworks	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	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

Software Engineering Track & Technical Electives

Select either Systems Programming track or Applications Development track to complete the requirements for the major. The technical	18 or
electives will vary depending on the track selected.	21

Total Credits	97-100

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
Technical Electives: Any 300-400 level CSCI or ECE courses not listed as program requirements above.		9

Total Credits	21

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
CSCI 489	Social Implications of Computers	3
Technical Electives: Any 300-400 level CSCI or ECE courses not listed as program requirements above.		6

Total Credits	18

Software Engineering Certificate

Certificate Requirements

Minimum Credits Required: 9

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

Soil Science Minor

Minor Requirements

Minimum Credits Required: 18

Code	Title	Credits
Required Courses		
SOIL 210	Introduction to Soil Science	3
SOIL 322	Soil Fertility and Fertilizers	3
SOIL 444	Soil Genesis and Survey	3
Elective Courses		
Select three of the following:		9
SOIL 264	Natural Resource Management Systems	
SOIL 351	Soil Ecology	
SOIL 410	Soils and Land Use	
SOIL 433	Soil Ecohydrology and Physics	
SOIL 447	Microclimatology	
SOIL/NRM/RNG 454	Wetland Resources Management	
SOIL 465	Soil And Plant Analysis	
Total Credits		18

Minor Requirements and Notes:

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

Spanish Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.

4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

A minimum grade of 'B' is required for all SPAN prefix courses counted for the Spanish major.

Code	Title	Credits
Spanish Major Core Requirements		
SPAN 311	Spanish Conversation and Composition I	3
SPAN 312	Spanish Conversation and Composition II	3
Advanced Language:		
SPAN 401 or SPAN 402	Advanced Spanish Grammar and Writing Advanced Spanish Conversation	3
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).

Spanish Minor

Minor Requirements

Minimum Credits Required:18

A minimum grade of 'B' is required for all courses used for the Spanish minor.

Code	Title	Credits
Minor Core Requirements		
SPAN 311	Spanish Conversation and Composition I	3
SPAN 312	Spanish Conversation and Composition II	3
SPAN 330 or SPAN 331	Introduction to Spanish Civilization Introduction to Spanish American Civilization	3
SPAN 401 or SPAN 402	Advanced Spanish Grammar and Writing Advanced Spanish Conversation	3
Select one course form the following:		3
SPAN 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 Studies Minor

Minor Requirements

Minimum Credits Required: 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 or SPAN 331	Introduction to Spanish Civilization ¹ Introduction to Spanish American Civilization	3
History Electives		
Must be a sequence. Or a history sequence appropriate to student's area of study.		
HIST 101	Western Civilization I	3
HIST 102	Western Civilization II	3
Additional Electives: Select one of the following:		3
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
GEOG 151	Human Geography	
GEOG 161	World Regional Geography	
POLS 220	International Politics	
SPAN 492	Global Practicum: Study Abroad	
Total Credits		18

¹ SPAN 330 or SPAN 331 may be completed through study abroad.

Minor Requirements and Notes

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

Spanish Education Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		

Category L: Digital Literacy

Total Credits		39
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.

Sport Coaching Certificate

Certificate Requirements

Minimum Credits Required: 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	Methods Of Coaching	3
Total Credits		10

Sport Management Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		

Category L: Digital Literacy

Total Credits	39

Major Requirements

Code	Title	Credits
Sport Management Core Requirements		
COMM 112	Understanding Media and Social Change	3
HNES 175	Sport in the Ancient World	3
SPMT 190	Introduction to Sport Management ¹	3
SPMT 192	Sport Management Practicum	1
SPMT 226	Socio-Cultural Dimension in Sport ²	3
SPMT 303	Sport Communication and New Media ²	3
SPMT 304	Sport Marketing and Public Relations ²	3
SPMT 323	Ethics of Sport ²	3
SPMT 414	Global Perspectives in Sport ²	3
SPMT 425	Current Topics in Sport Management ²	3
SPMT 426	Foundations of Sport Management ²	3
SPMT 431	Sport Law ²	3
SPMT 436	Sport Facility and Event Management ²	3
SPMT 444	Sport Finance ²	3
SPMT 485	Sport Management Internship ^{2,3}	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	76

¹ Requires a grade of 'B' or better.² Requires a grade of 'C' or higher.³ Students need to complete HNES 190, 226 and 304 before enrollment in HNES 485**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 SPMT major requirement courses (other than SPMT 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 SPMT 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 SPMT 190 as indicated in the footnote.
- Complete one credit in SPMT 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 Major**Major Requirements**

Degree Type: B.A. or B.S.
 Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	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

A minor is required in one of the following disciplines: Social Science, Physical Science, Biological Science, Business, Mathematics, or Computer Science. 16

Total Credits 65

Program Notes:

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Statistics Minor

Minor Requirements

Minimum Credits Required: 17 or 22

Select Standard Statistics Track or Applied Statistics Track

Standard Statistics 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 Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.

4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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

Strategic Communication Minor

Minor Requirements

Minimum Credits Required: 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 Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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
Supply Chain Management Electives		
SCM Prefix Courses	Any 9 credits of 300-400 level SCM prefix classes ²	9
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.

Supply Chain Management Minor

Minor Requirements

Minimum Credits Required: 18

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
Electives: Select 15 credits 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 463	Business Location Analytics	
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 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 Major (B.A./B.S.)

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 or THEA 115	World Theatre World Film	3
THEA 365	Directing I	3
THEA 450	Capstone Experience	3
THEA 480	History and Literature of Theatre I	3
THEA 371 or THEA 373 or THEA 375	Introduction to Design: Scenic Design * Lighting and Sound Design for the Theatre Costume Design for the Theatre	3
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 or THEA 280	World Film * 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	Scenic Painting	
THEA 345	Devising	
THEA 361	Acting III: Advanced Realism	
THEA 362	Dance Styles for Theatre	
THEA 364	Advanced Acting	
THEA 367	Acting the Song	
THEA 370	Technical Theatre Production	
THEA 371	Introduction to Design: Scenic Design *	
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 462	Acting Styles	
THEA 466	Advanced Voice for the Actor	
THEA 467	Advanced Movement for the Actor	
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	Scenic Painting	
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 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.

Theatre Arts - Design and Tech Theatre Major (B.F.A.)

Major Requirements

Degree Type: B.F.A.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 or MUSC 103	Music Appreciation Introduction to Music History	3
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	Scenic Painting *	3
THEA 280 or THEA 115	World Theatre World Film	3

THEA 365	Directing I	3
THEA 370	Technical Theatre Production (Take 3 credits 2 times) *	6
THEA 371	Introduction to Design: Scenic Design	3
THEA 373	Lighting and Sound Design for the Theatre	3
THEA 375	Costume Design for the Theatre	3
THEA 376	Theatrical Design Studio I: Theatrical Drawing and Rendering *	3
THEA 377	Theatrical Design Studio II: Collaboration of the Designer *	3
THEA 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.

Theatre Arts - Musical Theatre Major (B.F.A.)

Major Requirements

Degree Type: B.F.A.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	Stagecraft	4
& THEA 220	and Stagecraft Lab (Taken with THEA 270 Stagecraft)	
THEA 271	Costume Craft	4
& THEA 221	and Costume Craft Lab (Taken with THEA 271 Costume Craft)	
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.

Theatre Arts - Performance Major (B.F.A.)

Major Requirements

Degree Type: B.F.A.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1.

Minimum of 120 semester credits (some programs may exceed this minimum).
2.

Complete the University General Education requirements.
3.

Minimum institutional GPA of 2.00 based on work taken at NDSU.
4.

Minimum of 30 credits in resident at NDSU.
5.

Minimum of 36 upper level credits (courses numbered 300 or higher).
6.

Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 or THEA 115	World Theatre World Film	3
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.

Theatre Arts Minor

Minor Requirements

Minimum Credits Required: 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	Scenic Painting
THEA 345	Devising
THEA 362	Dance Styles for Theatre (repeatable up to 3 cr)
THEA 364	Advanced Acting
THEA 367	Acting the Song
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 Minor

Minor Requirements

Minimum Credits Required: 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 (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 Major

Major Requirements

Degree Type: B.U.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		

Total Credits**39**

B.U.S. Plan Proposal

The Bachelor of University Studies (B.U.S.) degree program is designed for students seeking a personalized, flexible path to graduation. Students begin by collaborating with an advisor at the Career and Advising Center to define their long-term goals. Together, they develop a proposal outlining these goals, summarizing prior education and experience, and detailing a tailored plan of study. This proposal, once signed by both the student and advisor, is submitted to the B.U.S. Program Review Committee for approval. Upon approval, the proposal becomes the student's individualized graduation requirements, ensuring they meet both general education and university-wide graduation standards.

The B.U.S. degree does not offer a designated major. Instead, students create one or more areas of emphasis relevant to their post-graduation aspirations. Each emphasis area requires a minimum of 12 credit hours, with at least six being upper-division courses. Students may also choose to complement their plan of study with an academic minor.

Degree plan proposals must be submitted to the B.U.S. Program Review Committee by established deadlines: October 1 for spring or summer graduation, and February 1 for fall graduation. A minimum of 15 credit hours included in the proposal must be completed after the Committee's approval.

Veterinary Technology Major

Major Requirements

Degree Type: B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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 or ANSC 201	Student Success Techniques: Veterinary Technology * Student Success Techniques - Nontraditional & Transfer Students	1
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 ²	2
VETS 485	Veterinary Technology Externship (Capstone Course) *	3
ANSC 114	Introduction to Animal Sciences *	3
ANSC 223	Introduction to Animal Nutrition *	3
ANSC 370	Fundamentals/Animal Disease *	3
ANSC 371	Fundamentals of Animal Disease II *	3
BIOL 111	Concepts of Biology	3
or BIOL 150	General Biology I	
CHEM 117	Chemical Concepts and Applications	3
or CHEM 121	General Chemistry I	
CSCI 114	Computer Applications	3
or TL 116	Business Software Applications	
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
Total Credits		74

* 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.

² Students will take this class during the fall and spring semesters during the second year of being admitted to the major for one credit each time.

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 Certificate

Certificate Requirements

Minimum Credits Required: 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:		
ABEN 464	Resource Conservation and Irrigation Engineering	3
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 Minor

Minor Requirements

Minimum 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
ARMD 210	Dress in World Cultures	3
or BUSN 211	World Culture and Food Service	
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	
HPER 217	Personal and Community Health	
RELS 100	World Religions	

SOC 115	Social Problems	
SOC 214	Social Interaction	
Total Credits		18

Minor Requirements and Notes:

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

Women and Gender Studies Major

Major Requirements

Degree Type: B.A. or B.S.
Minimum Credits Required: 120

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (p. 65) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (p. 55).

Code	Title	Credits
Category C: Communication		12
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		
Category L: Digital Literacy		
Total Credits		39

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	

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 426	Women in American History
PSYC 210	Human Sexuality
PSYC 250	Developmental Psychology
SOC 235	Cultural Diversity
SOC 410	Social Inequality
SOC 412	Sociology of Gender
SOC 417	Sociology of the Family
SOC 439	Social Change
WGS 112	Introduction to Masculinities
WGS 340	Perspectives in LGBTQ Studies
WGS 496	Field Experience

Total Credits**33**

Women and Gender Studies Minor

Minor Requirements

Minimum Credits Required: 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 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
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 Minor

Minor Requirements

Minimum Credits Required: 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.*

Course Descriptions

- Course Descriptions (p. 613)
- Course Definitions, Format, and Number Classification (p. 610)

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. 613). 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 or remedial courses are designed to develop skills for students to prepare them for college-level coursework. These courses are not degree applicable and the grade is not factored into the grade-point average (GPA) unless otherwise stated in academic policy. Course credits for developmental or remedial courses will count for financial aid credit and to determine full- and part-time status.

100 series courses: Introductory classes designed to give first-year students a survey of a specific topic area. Considered lower division.

200 series courses: Intermediate courses designed for students who have taken a foundational course in a specific topic area. Courses expand on ideas central to the discipline. Considered lower division.

300 series courses: Courses contain concepts, methods, and techniques central to a specific discipline. Courses are mostly major specific and prepare students to meet the learning outcomes for the major. Considered upper division.

400 series courses: Courses are designed for students to synthesize, evaluate complex concepts, and master skills within the discipline. Courses are mostly major specific and focus on current terms, techniques and approaches that shape the discipline. Considered upper division.

500 series courses: Courses are designated for professional programs that lead to entry into practice professions or post-baccalaureate programs. Courses are advanced to prepare students for work in a specific field or discipline.

601-699 series courses: Graduate level courses taught concurrently in the same classroom with advanced undergraduates at the 400 level. Courses exist at the 600 level only if there is a 400 level counterpart.

700 series courses: Graduate level courses open to students in master's, doctoral, and graduate certificate programs.

800 series courses: Graduate level courses predominately intended for doctoral level graduate students.

2000 series courses: Continuing education for post-baccalaureate learning. Continuing education courses are 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: AGECE 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: AGECE 244.

AGEC 346. Applied Risk Analysis. 3 Credits.

Development of tools to analyze business and financial risk problems unique to farms and agribusinesses. Prereq: AGECE 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 AGECE 246 or FIN 320.

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: AGECE 242, AGECE 244, or AGECE 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: AGECE 339. {Also offered for graduate credit - see AGECE 644.}.

AGEC 445. Agribusiness Industrial Strategy. 3 Credits.

The course integrates industrial organization topics with specific applications to agribusiness strategy problems. Focus is on industry analysis and issues in competition, strategy, and rivalry from an agribusiness perspective. Prereq: AGECE 344. Coreq: AGECE 339.

AGEC 446. Agribusiness Finance. 3 Credits.

Application of financial theory to investment and liability management problems of agribusiness and farm firms. Characteristics, operations, and management of agricultural financial institutions. 3 lectures. Prereq: AGECE 339. Co-req: AGECE 346. {Also offered for graduate credit - see AGECE 646.}.

AGEC 450. National AgriMarketing Association (NAMA) I. 1 Credit.

Learn the components of an agribusiness marketing plan and apply this knowledge in the development of a marketing plan for a selected product. 1 lecture. May be repeated for credit.

AGEC 451. National AgriMarketing Association (NAMA) II. 1 Credit.

Review the components of an agribusiness marketing plan. Work in teams to prepare written and oral marketing plans for the National NAMA student chapter competition. 1 lecture. May be repeated for credit. Recommended prereq: AGEC 450.

AGEC 452. Food Laws and Regulations. 3 Credits.

Overview of U.S. federal and state laws and international food standards with emphasis on U.S. federal regulatory agencies. Cross-listed with CFS 452 and SAFE 452. Dual-listing: CFS 652 AGEC 652 SAFE 652.

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 and Regulations. 3 Credits.

Overview of U.S. federal and state laws and international food standards with emphasis on U.S. federal regulatory agencies. Cross-listed with CFS 652 SAFE 652. Dual-listing: CFS 452 AGEC 452 SAFE 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, AGECE 741. Cross-listed with SAFE 720.

AGEC 725. Food Policy. 3 Credits.

Provides quantitative tools and models used to analyze general food safety policies. Three lectures. Prereq: SAFE 670. Cross-listed with SAFE 725 and CFS 725.

AGEC 739. Analytical Methods for Applied Economics. 3 Credits.

Study and application of operations research techniques and other decision methods to problems in agriculture, transportation, and resource management. 3 lectures.

AGEC 741. Advanced Microeconomics. 3 Credits.

Advanced analysis of demand, production, and costs; pricing output and resource allocation under various market structures.

AGEC 743. Advanced Macroeconomics. 3 Credits.

Advanced analysis of macroeconomic theories; economic growth, business fluctuations, and inflation.

AGEC 744. Agribusiness I: Agricultural Product Marketing and Agribusiness Strategy. 3 Credits.

Conceptual foundations of agribusiness strategy, food product marketing, and strategic planning are presented. Emphasis is placed on quantitative strategic decision making for the agribusiness firm.

AGEC 771. Economics of Transportation Systems. 3 Credits.

The course will provide an understanding of transportation economics and policy issues facing society. Topics include transportation demand, model costs, transportation competition and market power, transportation regulation, transportation investment, and the economics of transportation safety. Cross-listed with CE 771.

AGEC 784. Empirical International Trade and Policy. 3 Credits.

Empirical aspects of international trade, foreign investment, and the environment. Issues related to testing various trade models. Selected topics include testing trade models, gravity models, linkages between openness and growth, trade orientation and firm performance, trade patterns, trade and the environment, and labor markets and trade. Emerging topics in international economics with a focus on empirical applications. Use of advanced statistical modeling and data visualization techniques. Prereq: ECON 610 and AGECE 741 or equivalents. Cross-listed with ECON 784.

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. Coreq: 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 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 ME 350. Dual-listing: 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 477. Finite Element Analysis 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. Prereq: MATH 128 and MATH 166. Dual-listing: ABEN 677.

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: ME 222 and ASM/NRM/SOIL 264, or SOIL 210. Dual-listing: ABEN 684.

ABEN 486. Design Project I. 3 Credits.

Capstone learning experience involving principles of design, project management, and evaluation. Student teams define a capstone project in their area of interest. Prereq: ABEN 263 and senior standing.

ABEN 487. Design Project II. 3 Credits.

Continuation and completion of the capstone learning experience begun in ABEN 486. Communication in oral, written, and graphic forms is emphasized. Prereq: ABEN 486.

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 677. Finite Element Analysis in Agricultural and Biosystems Engineering. 3 Credits.

Numerical modeling using finite element and other numerical techniques. Engineering applications include modeling of stress/strain and heat/mass transfer in physical, natural resource, and biological systems such as grain and food products. Dual-listing: ABEN 477.

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 194. Individual Study. 1-3 Credits.

ASM 196. Field Experience. 1-15 Credits.

ASM 199. Special Topics. 1-5 Credits.

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 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 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.

Agricultural Technology (AGT)

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 695. 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 115. Introduction to Livestock Health Management and Welfare. 3 Credits.

Introductory animal health and welfare concepts are covered with an emphasis on immune function and disease, on-farm animal welfare, handling and health assessment, and strategies for maintaining herd health.

ANSC 130. Foundations of Livestock and Product Evaluation. 2 Credits.

This course is designed to introduce students to the foundational skills of livestock evaluation in relation to production and product goals. The course will also provide an overview of the principle techniques used to assess the quality and value of livestock (beef & dairy cattle, swine, sheep, and goats) as well as their products (meat, milk, and wool).

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. 3 Credits.

Principles of feeding animals including nutrient characteristics, nutrient requirements, feed/food resources, and the structure and function of digestive systems in animals.

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 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, 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 751. Quantitative Genetics I. 3 Credits.

Understand the combination of genetic and statistical principles so that populations of sexually reproducing organisms can be manipulated for genetic improvement and/or to study evolutionary change. It is recommended to take STAT 711 or ANSC 740 or equivalent before taking this class.

ANSC 752. Quantitative Genetics II. 3 Credits.

Advanced understanding of the combination of genetic and statistical principles so that populations of sexually reproducing organisms can be manipulated for genetic improvement and/or to study evolutionary change, including application of frequentist and Bayesian statistical approaches. It is recommended student take ANSC 751 or equivalent before taking this class.

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 790. Graduate Seminar. 1-5 Credits.

ANSC 791. Temporary/Trial Topics. 1-5 Credits.

ANSC 792. Graduate Teaching Experience. 1-6 Credits.

ANSC 793. Individual Study/Tutorial. 1-5 Credits.

ANSC 795. Field Experience. 1-15 Credits.

ANSC 796. Special Topics. 1-5 Credits.

ANSC 797. Master's Paper. 1-3 Credits.

ANSC 798. Master's Thesis. 1-10 Credits.

ANSC 828. Advanced Reproductive Biology. 3 Credits.

Discussion of reproductive physiology research with emphasis on current topics in cellular and molecular biology. 3 lectures. S (odd years).

ANSC 830. Growth Biology. 3 Credits.

Regulation of growth at the cell/tissue, organ systems, and whole animal levels. 3 lectures. S (even years).

ANSC 892. Graduate Teaching Experience. 1-6 Credits.

ANSC 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.

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, 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 Archaeology. 3 Credits.**

Examines the development, methods, and research themes of historical archaeology. Cross-listed with HIST 638. Dual-listing: ANTH 438, 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, Retail Merchandising, and Design (ARMD)

ARMD 101. Beginning Apparel Construction. 3 Credits.

Introduction to basic apparel assembly methods and use of a sewing machine.

ARMD 155. Apparel Construction and Fit. 3 Credits.

Principles of apparel construction and analysis. Construction of a fitting sloper and two fashion garments. Prereq: ARMD 101.

ARMD 171. Fashion Dynamics. 3 Credits.

Introductory course tracing the development of fashion and its industry that includes consumer demand and fashion change, the development, production, and marketing of goods from concept to consumer, and their interrelationships.

ARMD 181. Aesthetics and Visual Analysis of Apparel Products. 3 Credits.

Analysis of aesthetics and design principles and their application to apparel and textiles products, environment and oneself.

ARMD 203. Sustainability and Social Change in Fashion. 3 Credits.

This course explores the interrelationship between environment, society, economy and culture as they pertain to the global fashion industry. Practical and conceptual issues will be discussed to develop sustainable practices in our daily and professional lives.

ARMD 210. Dress in World Cultures. 3 Credits.

Analysis of world dress as related to cultural, technological aesthetic, and social patterns. Concepts illustrated through comparative studies of selected world cultures.

ARMD 233. Fashion Show Production. 1 Credit.

This course focuses on the planning and execution of fashion shows. Students will gain hands-on experience in event management, fashion promotion, and production logistics while applying industry-standard practices to showcase student designs in a professional setting. May be repeated for credit.

ARMD 280. Technology Applications for the Apparel Industry. 3 Credits.

Introduction to the basic digital techniques of Adobe Creative Suite to develop presentation skills necessary in textile and apparel industries. Prereq: ARMD 181.

ARMD 310. History of Fashion. 3 Credits.

Historic view of the evolution of fashion in the Western world through time as it relates to political/sociological/economic change. F.

ARMD 355. Apparel Design Studio. 3 Credits.

This course examines the principles of apparel construction, fit, and pattern design, guiding students through the process of creating well-constructed garments. Students will develop a cohesive clothing line by applying advanced apparel assembly techniques, constructing fitting muslins, and producing two fashion garments that reflect industry standards in design and craftsmanship. May be repeated for credit. Prereq: ARMD 101 or instructor approval via proficiency test.

ARMD 366. Textiles. 3 Credits.

Fibers, yarns, fabric construction, finishes, and dyestuffs related to selection, use, and maintenance of textile products. Coreq: ARMD 367.

ARMD 367. Textiles Laboratory. 1 Credit.

Textile product characterization through the analysis of yarn type, fabric, construction, finishes, and dyestuffs; care procedures; simple identification of fibers, yarns, and fabrics. Coreq: ARMD 366.

ARMD 370. Sewn-Product Manufacturing and Analysis. 3 Credits.

Analysis of the sewn-product manufacturing processes, governmental regulations, sourcing, and technology applications. Focus on evaluating products, quality, performance, and cost. Prereq: ARMD 366, ARMD 367 or departmental approval.

ARMD 371. Fashion Trend Analysis and Forecasting. 3 Credits.

Study of techniques and processes of identifying past and present trends and methods for forecasting future trends, with applications in the apparel and home fashion, textiles and retail industries. Prereq: ARMD 181 and ARMD 280.

ARMD 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 MRKT 372.

ARMD 373. Visual Merchandising and Promotion. 3 Credits.

Principles, procedures and sources of information essential for marketing and promoting retail merchandise sales. Experience in planning, executing and evaluating promotion plans. Prereq: ARMD 280.

ARMD 375. Professional Development. 1 Credit.

Internship and career planning including professional expectations and responsibilities. Skills gained in resume and portfolio development, writing cover letters, interviewing techniques, and business etiquette. Prereq or Coreq: At least junior standing.

ARMD 385. Global Fashion Economics. 3 Credits.

Study of factors affecting production, distribution, and consumption of products in domestic and foreign textile and apparel industries. Prereq: ARMD 171 and ECON 105, ECON 201, or ECON 202. Prereq or Coreq: Junior standing.

ARMD 386. Merchandise Planning and Buying. 3 Credits.

This course intends to provide an overview of merchandise planning and buying. This course will introduce students to the principles, mathematical formulas and concepts of retail buying and assortment planning. Prereq: ARMD 171.

ARMD 425. Experiential Retailing. 3 Credits.

Explore experiential retailing of products, services and experiences that encompass utilitarian and hedonic consumption. Apply strategies for planning, developing, and presenting products or services to create a total consumer experience. Prereq: ARMD 140 or ARMD 171 or MGMT 320 or MRKT 320. Dual-listing: ARMD 625.

ARMD 455. Apparel Design and Assembly. 3 Credits.

Application of the principles and concepts of pattern design and apparel assembly to the creation of garments in a particular category of apparel: tailored jackets, dresses, formalwear and casual sportswear. May be repeated. Prereq: ADHM 155.

ARMD 470. Retail Financial Management and Control. 3 Credits.

Advanced applications of the principles and mathematics in merchandise planning, buying, and control process. Prereq: ARMD 386, CSCI 114 or TL 116, MRKT 320, MGMT 320 and ACCT 102.

ARMD 472. Product Development. 3 Credits.

Examination of issues and strategies necessary to produce soft goods in relation to product development, sourcing and manufacturing. Focus on developing technical specifications relative to quality, performance and cost of apparel products. Prereq: ADHM 280, ADHM 366, ADHM 367, ADHM 371 and ADHM 385.

ARMD 481. Capstone in Apparel, Retail Merchandising and Design. 3 Credits.

Critically analyze and propose research-based solutions to problems related to apparel and textiles including production, distribution, and retailing of goods and services. Prereq: ARMD 385 and ENGL 320 or ENGL 322 or ENGL 326 or ENGL 357. Prereq or Coreq: Junior standing.

ARMD 486. Dress and Human Behavior. 3 Credits.

Influence of dress and appearance on human behavior throughout the life cycle. F.

ARMD 489. Study Tour. 1-3 Credits.

Faculty-directed tour to key fashion, design, tourism destinations, or business centers in the U.S. and abroad. Visits to off-campus destinations provide students contact with practicing professionals as they are exposed to the fast pace of a changing global industry. May be repeated. Prereq: ARMD 140 or ARMD 160, ARMD 171.

ARMD 491. Seminar. 1-5 Credits.**ARMD 496. Field Experience. 1-15 Credits.****ARMD 625. Experiential Retailing. 3 Credits.**

Explore experiential retailing of products, services and experiences that encompass utilitarian and hedonic consumption. Apply strategies for planning, developing, and presenting products or services to create a total consumer experience. Dual-listing: ARMD 425.

ARMD 710. Consumer Behavior in Merchandising. 3 Credits.

Evaluation of psychological, sociological, and cultural theories of consumer behavior through the examination of factors influencing the consumer decision-making process.

ARMD 720. Professional Advancement. 3 Credits.

Analysis of leadership and how it affects organizational culture and change through past and current experiences. Various leadership styles examined and a personal leadership philosophy developed for professional advancement in merchandising.

ARMD 730. Product Design, Development and Evaluation. 3 Credits.

Advanced study of issues and management strategies necessary to design and produce a competitively priced product. Examination of the role of globalization and rapidly changing technology on the development of a successful product.

ARMD 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.

ARMD 740. Promotional Strategies in Merchandising. 3 Credits.

Examination of integrated marketing communications (i.e., promotional strategies and techniques) while fostering cultural and global awareness, social responsibility and ethical decision-making in the field of promotion.

ARMD 750. Retail Theory and Current Practice. 3 Credits.

Theoretical and applied analysis of merchandising strategies; assessment of internal and external environmental forces impacting strategic decisions by retail firms; synthesis of past and present trends in order to forecast probable future patterns.

ARMD 765. Merchandising Analytics. 3 Credits.

Merchandising Analytics addresses the use of quantitative data from the merchandising industry to support managerial decision making: specifically, how to format and analyze typical consumer data. Students will apply analytical approaches to problem solving using Microsoft Excel including: Formulas, Functions, Solver, and Pivot Tables.

ARMD 770. International Retail Expansion. 3 Credits.

Comprehensive understanding of theory, practices, and trends on international merchandise management. An analysis of global retail system and the way goods are distributed to consumers in various countries. Prereq: ARMD 710, ARMD 720, ARMD 730, ARMD 740, ARMD 750.

ARMD 775. Research Methods in Merchandising. 3 Credits.

An overview of the research process used in social science, including an overview and analysis of research methodologies. Also includes a review of current merchandising literature with implications for future research. Prereq: ARMD 710, ARMD 720, ARMD 730, ARMD 740, ARMD 750. Prereq or Coreq: Graduate level statistics course.

ARMD 780. Financial Merchandising Implications. 3 Credits.

The advanced study of financial trends in the merchandising industries; implications related to varied organizational structures. Foci will be on the financial implications of recent advances in the field. Prereq: ARMD 710, ARMD 720, ARMD 730, ARMD 740, ARMD 750.

ARMD 785. Strategic Merchandise Planning. 3 Credits.

Examination of the executive planning process utilized to develop successful corporate strategies; emphasis on the importance of a market orientation for building customer value and sustaining a competitive advantage. Prereq: ARMD 710, ARMD 720, ARMD 730, ARMD 740, ARMD 750.

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 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 the Architecture major.

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 444. Advanced Systems and Environment. 3 Credits.

Overview of the building systems integration approach to the architectural design process. Prereq: ARCH 344, ARCH 471 or ARCH 474. Dual-listing: ARCH 644.

ARCH 450. Architectural Detailing. 3 Credits.

Study of wood, steel, masonry, concrete, and other miscellaneous construction assemblies, focusing on the detail, 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, and other environmental concerns. Prereq: ARCH 272. Dual-listing: ARCH 653.

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 643. 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 or Coreq: Admission to Department of Architecture graduate MArch program. Dual-listing: ARCH 443.

ARCH 644. Advanced Systems and Environment. 3 Credits.

Overview of the building systems integration approach to the architectural design process. Dual-listing: ARCH 444.

ARCH 650. Architectural Detailing. 3 Credits.

Study of wood, steel, masonry, concrete, and other miscellaneous construction assemblies, focusing on the detail, with an introduction to specifications and construction documents. Dual-listing: ARCH 450.

ARCH 653. 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. Dual-listing: ARCH 453.

ARCH 661. Urban Design. 3 Credits.

Study of urban form and urban theory, development, and processes in a historic and contemporary context. Dual-listing: ARCH 461.

ARCH 671. Architectural Design V. 6 Credits.

Studio courses involving the complex organization of architectural spaces and forms in an urban context. Prereq or Coreq: Admission to the NDSU Graduate MArch degree program. Dual-listing: ARCH 471.

ARCH 672. Architectural Design VI. 6 Credits.

Studio courses involving the complex organization of architectural spaces and forms in an urban context. Prereq or Coreq: Admission to the NDSU Graduate MArch degree program. Dual-listing: ARCH 472.

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. 6 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 763 and ARCH 771.

ARCH 781. Professional Practice. 3 Credits.

Study of contemporary architectural practice covering professional development, firm organization, and project management within the context of the ethical, legal, and regulatory environment. Cross-listed with LA 581.

ARCH 789. Professional Topics in Architecture. 3 Credits.

Various topics related to theoretical or methodological aspects of architecture as a professional discipline. May be repeated.

ARCH 790. Graduate Seminar. 1-3 Credits.**ARCH 793. Individual Study. 1-5 Credits.****ARCH 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 Art & Design. Lectures, demonstrations, and class assignments offer students an introduction to core digital technologies in the visual arts and equip students with a working knowledge of their respective operations and applications. Prereq or Coreq: Art major or minor, Art Education major, or Apparel Retail Merchandising major or minor.

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 381. Typography & Layout. 3 Credits.

Development of concepts and practices related to graphic design, digital technologies and their applications in design and visual arts, with an emphasis on the study and application of typography in design work and layout design. Prereq: ART 185. Prereq or Coreq: Must be declared a Art major or minor, Art Education major, Apparel Retail Merchandising Design major or minor, or Graphic Design major or minor.

ART 382. Branding & Packaging. 3 Credits.

Development of concepts and practices related to graphic design, digital technologies and their applications in design and visual arts, with an emphasis on developing branding and packaging for design opportunities. Prereq: ART 185. Prereq or Coreq: Must be declared as a Graphic Design major or minor, Art major or minor, Art Education major, or Apparel Retail Merchandising Design major or minor.

ART 383. Illustration Concepts & Narrative. 3 Credits.

Advanced study of concepts and studio practice related to digital technologies and their applications in graphic design and visual arts with an emphasis on illustration and visual narratives. Prereq: ART 185. Prereq or Coreq: Must be declared Graphic Design major or minor, Art major or minor, Art Education major, or Apparel Retail Merchandising Design major or minor.

ART 384. Motion Graphics & Animation. 3 Credits.

Advanced study of concepts and studio practice related to digital technologies and their applications in graphic design and visual arts, with an emphasis in motion graphics and animation. Prereq: ART 185. Prereq or Coreq: Must be declared Graphic Design major or minor, Art major or minor, Art Education major, or Apparel Retail Merchandising Design major or minor.

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.**

Artificial Intelligence (AI)

Athletic Training (ATR)

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 prokaryotes, eukaryotes and archaea, with primary emphasis on eukaryotic systems. Prereq: BIOC 460, BIOC 461.

BIOC 491. Seminar. 1-5 Credits.**BIOC 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BIOC 493. Undergraduate Research. 1-5 Credits.**BIOC 494. Individual Study. 1-5 Credits.****BIOC 496. Field Experience. 1-15 Credits.****BIOC 499. Special Topics. 1-5 Credits.****BIOC 660. Foundations of Biochemistry and Molecular Biology I. 3 Credits.**

Rigorous treatment of biomolecules, generation and use of metabolic energy, biosynthesis, metabolic regulation; storage, transmission, and expression of genetic information. 3 lectures. {Also offered for undergraduate credit - see BIOC 460.}.

BIOC 661. Foundations of Biochemistry and Molecular Biology II. 3 Credits.

Interrelations between metabolic pathways and controls, with emphasis on mammalian systems; biochemistry of specialized tissues, fluids, and hormones; regulation of gene expression in eukaryotes; genetic defects in metabolism. 3 lectures. {Also offered for undergraduate credit - see BIOC 461.}.

BIOC 673. Methods of Biochemical Research. 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 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.

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.

BIOL 104. Human Anatomy and Physiology Prep. 1 Credit.

This course is designed to improve the success of students when taking Human Anatomy and Physiology. The focus of the course will be to develop language literacy, visual literacy, study skills, and the understanding of science concepts that are fundamental to Human Anatomy and Physiology. Restrictions: First-year students.

BIOL 111. Concepts of Biology. 3 Credits.

Introduction to a wide range of biological topics, from the organism, ecology, and evolution to the cell, molecular biology, and genetics. For credit as a lecture/lab pair, students should take BIOL 100L as a co-requisite.

BIOL 124. Environmental Science. 3 Credits.

Ecological principles related to human cultures, resource use, and environmental alterations. For credit as a lecture/lab pair, students should take BIOL 100L as a co-requisite.

BIOL 126. Human Biology. 3 Credits.

Consideration of selected problems in human biology. For credit as a lecture/lab pair, students should take BIOL 100L as a co-requisite.

BIOL 150L. General Biology I Laboratory. 1 Credit.

Introduction to cellular and molecular biology, genetics, and evolution.

BIOL 150. General Biology I. 3 Credits.

Introduction to cellular and molecular biology, genetics, and evolution.

BIOL 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 191. Seminar. 1-5 Credits.

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 eukaryotic DNA, and annotation of *Drosophila* sp. DNA. Prereq: BIOL 150 and BIOL 150L and 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 Taxonomy. 3 Credits.

An introduction to the identification, classification and evolution of vascular plants, with an emphasis on flowering plants (the angiosperms). Students will learn techniques for plant identification and the characteristic traits of plant families worldwide within the framework of our current understanding of plant evolutionary relationships. Students will use weekly field trips to develop their skills in collection and identification of plants. Prereq: BIOL 151 or by permission of instructor. Dual-listing: BIOL 614.

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 474. Undergraduate Research Experience: Biomedical Research Analysis. 3 Credits.

This is an authentic course-based 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 completing a meta-analysis to assess the effectiveness of a biomedical intervention of their choice. Prereq: BIOL 150, BIOL 150L, BIOL 151 and BIOL 151L.

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 484. Cancer Biology. 3 Credits.

This course is an introduction to the cellular and molecular basis of human cancers, with an emphasis on how malignant cells hijack normal cellular functions. The six major hallmarks of cancer will be the primary units of this course. Current issues, methodologies, and perspectives in modern cancer research will also be discussed. Prereq: BIOL 370 with a grade of C or better and BIOL 150.

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, COMM 401.

BIOL 614. Plant Taxonomy. 3 Credits.

An introduction to the identification, classification and evolution of vascular plants, with an emphasis on flowering plants (the angiosperms). Students will learn techniques for plant identification and the characteristic traits of plant families worldwide within the framework of our current understanding of plant evolutionary relationships. Students will use weekly field trips to develop their skills in collection and identification of plants. Dual-listing: BIOL 414.

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 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 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 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 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.

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.

Focuses on empowering students with advanced Excel skills for business analytics, enhancing their capability to analyze and interpret data effectively. The course blends theoretical knowledge with practical application, teaching students to use analytical tools to make data-driven decisions that align with business strategies. This hands-on approach prepares students for real-world business challenges, enabling them to contribute to business insights and decision-making in professional settings. No mathematical background beyond high school algebra is required for an understanding of the material. Prereq or Coreq: College of Business major, minor or certificate or BS in Data Science 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 474. Cooperatives. 3 Credits.

Theory, practice, and evaluation of cooperatives including principles, management, marketing, finance, taxes, legal issues, and adjusting to change. Prereq: ECON 201. Cross-listed with AGECE 474. {Also offered for graduate credit - see BUSN 674.}.

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 674. Cooperatives. 3 Credits.

Theory, practice, and evaluation of cooperatives including principles, management, marketing, finance, taxes, legal issues, and adjusting to change. Cross-listed with AGECE 674. F, S, Su. {Also offered for undergraduate credit - see BUSN 474.}.

BUSN 690. Graduate Seminar. 1-3 Credits.

BUSN 692. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BUSN 696. Special Topics. 1-5 Credits.

BUSN 790. Graduate Seminar. 1-3 Credits.

BUSN 791. Temporary/Trial Topics. 1-5 Credits.

BUSN 793. Individual Study/Tutorial. 1-5 Credits.

BUSN 794. Practicum/Internship. 1-8 Credits.

BUSN 795. Field Experience. 1-15 Credits.

BUSN 796. Special Topics. 1-5 Credits.

BUSN 797. Master's Paper. 1-3 Credits.

BUSN 798. Master's Thesis. 1-10 Credits.

Cereal & Food Sciences (CFS)

CFS 194. Individual Study. 1-3 Credits.

CFS 196. Field Experience. 1-15 Credits.

CFS 199. Special Topics. 1-5 Credits.

CFS 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.

To develop an appreciation for Cereal Technology from an overview of cereal grains, their quality, attributes, common processing technologies, and end product utilization. Dual-listing: CFS 650.

CFS 452. Food Laws and Regulations. 3 Credits.

Overview of U.S. federal and state laws and international food standards with emphasis on U.S. federal regulatory agencies. Cross-listed with AGE 452 and SAFE 452. Dual-listing: CFS 652, AGE 652, SAFE 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 as well as students who are seeking undergraduate or graduate certificates in food safety as well as for Master of Agriculture students. 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. Dual-listing: 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.**

To develop an appreciation for Cereal technology from an overview of cereal grains, their quality attributes, common processing technologies and end product utilization. Dual-listing: CFS 450.

CFS 652. Food Laws and Regulations. 3 Credits.

Overview of U.S. federal and state laws and international food standards with emphasis on U.S. federal regulatory agencies. Cross-listed with AGECE 652 SAFE 652. Dual-listing: CFS 452 AGECE 452 SAFE 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. 2-3 Credits.

This is an advanced course for food science majors, engineers or professionals interested in advanced topics in cereal and 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, food safety of fermented foods. Dual-listing: CFS 472.

CFS 673. Food Safety. 3 Credits.

This is an advanced course for Food and Cereal Science majors interested in food safety as well as students who are seeking undergraduate or graduate certificates in food safety as well as for Master of Agriculture students. 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. Dual-listing: 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 AGECE 725 and SAFE 725.

CFS 758. Fundamentals of Flour Testing and Baking. 3 Credits.

Flour testing, industrial, and experimental bread baking. Production methods, ingredients, and baking reactions. Lectures and laboratories. Prereq: CFS 650.

CFS 759. Milling. 2-3 Credits.

Experimental and industrial feed and flour milling. Production, equipment, and factors involved in the milling process.

CFS 760. Pasta Processing. 2-3 Credits.

Durum wheat quality, pasta production, and pasta quality evaluation.

CFS 761. Malting and Brewing. 2 Credits.

Barley and malt quality; malting and brewing. 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 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 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 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 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 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 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 431. Analytical Chemistry I. 3 Credits.

Chemical equilibrium and its analytical applications; introduction to chromatography and potentiometry. Prereq: CHEM 122 or CHEM 151, CHEM 122L or CHEM 161 and CHEM 342.

CHEM 431L. Analytical Chemistry I Laboratory. 2 Credits.

Chemical equilibrium and its analytical applications; introduction to chromatography and potentiometry. Prereq: CHEM 122L or CHEM 161.

CHEM 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, chiroptical, vibrational, paramagnetic resonance, and nuclear spectroscopic methods along with their applications to the study of molecular and biomolecular systems. Prereq: CHEM 625 or BIOC 665.

CHEM 729. X-Ray Structure Determination. 2 Credits.

Use of single crystal X-ray diffraction data to determine molecular and crystal structures. Half semester.

CHEM 730. Separations. 2 Credits.

Theory of equilibrium chemistry in aqueous and nonaqueous systems; principles of chromatographic and other separation techniques. Prereq: CHEM 632.

CHEM 732. Advanced Survey of Analytical Chemistry. 4 Credits.

Theoretical basis and application of several modern chemical analysis techniques. The focus will be the application of electrochemistry, chromatography, electrophoresis, and mass spectrometry in the chemical and biochemical analysis.

CHEM 734. Instrumentation Electronics. 5 Credits.

Design and operation of digital and analog circuits used in chemical instrumentation, computer interfacing. Includes laboratory. Prereq: CHEM 632.

CHEM 736. Mass Spectrometry. 2 Credits.

Theory and application of mass spectrometry in analysis, tandem mass spectrometry, ionization techniques. Half semester. Prereq: CHEM 632.

CHEM 741. Physical Organic Chemistry I. 4 Credits.

Principles governing the reactivity of organic compounds and methods for determining reaction mechanisms.

CHEM 742. Physical Organic Chemistry II. 2 Credits.

Aromaticity, electrophilic substitution, Woodward-Hoffman rules. Half semester. Prereq: CHEM 741.

CHEM 743. Reactive Intermediates. 2 Credits.

Radicals, carbenes, nitrenes, arynes, carbenium ions, survey of other reactive intermediates. Half semester. Prereq: CHEM 741.

CHEM 744. Organic Spectroscopy. 2 Credits.

Structure elucidation by spectrometric methods, including infrared, mass spectrometry, UV, and nuclear magnetic resonance. Interpretation of 2-D NMR spectra. Half semester.

CHEM 745. Organic Synthesis. 4 Credits.

Functional group synthesis, synthetic design, stereochemical control. Prereq: CHEM 741.

CHEM 746. Advanced NMR Spectrometry. 2 Credits.

Theory of pulsed FT-NMR, instrumentation, pulse sequences (with emphasis on multipulse experiments), two-dimensional NMR and applications. Half semester. Prereq: CHEM 744.

CHEM 747. Heterocycles. 2 Credits.

Synthesis of heterocycles, aromaticity, organometallic chemistry, nucleosides, natural products. Prereq: CHEM 745.

CHEM 748. Total Synthesis of Natural Products. 2 Credits.

Retrosynthetic analysis, total synthesis, terpenes, alkaloids will be studied. Prereq: CHEM 745.

CHEM 754. Organic Spectroscopy Laboratory. 1 Credit.

Laboratory to accompany 744, with emphasis on NMR techniques. Half semester. Coreq: CHEM 744.

CHEM 759. Advanced Survey of Physical Chemistry. 4 Credits.

Fundamental principles of physical chemistry including quantum chemistry, spectroscopy, molecular thermodynamics, and kinetics.

CHEM 760. Statistical Thermodynamics. 4 Credits.

Macroscopic and microscopic models for the study of equilibrium properties of pure phases and solutions.

CHEM 761. Optical Spectroscopy. 2 Credits.

Theory and practice of modern spectroscopic methods. Emphasis on visible and ultraviolet wavelength ranges. Half semester. Prereq: CHEM 632.

CHEM 763. Kinetics. 2 Credits.

Experimental methods to determine reaction rates, empirical rate laws, transition state theory. Half semester.

CHEM 764. Dynamics. 2 Credits.

Chemical physics of energy transfer and reactive collisions. Half semester. Prereq: CHEM 763.

CHEM 766. Quantum Chemistry I. 4 Credits.

Wave functions and their properties, quantum mechanical behavior of atoms and molecules.

CHEM 767. Quantum Chemistry II. 2 Credits.

Ab initio and semi-empirical methods for the calculation of energetic and structural properties of molecules; computational methods. Half semester. Prereq: CHEM 766.

CHEM 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 303L. Civil Engineering Materials Laboratory. 1 Credit.**

Tests for evaluating raw materials and mix designs of different types of bituminous materials and Portland cement concrete. 1 three-hour laboratory. Prereq: ME 223. Co-req: CE 303, F S.

CE 303. Civil Engineering Materials. 2 Credits.

Physical, mechanical and chemical properties of different types of bituminous materials and Portland cement concrete; industry standards for evaluating raw materials and mix designs. 2 one-hour lectures. Prereq: ME 223. F, S.

CE 309. Fluid Mechanics. 3 Credits.

Statics, kinematics, and dynamics of fluid flow; momentum and energy concepts; flow through pipes; uniform flow in open channels; pumps and measurement of flow. 3 one-hour lectures. Prereq: ME 222. F, S.

CE 310. Fluid Mechanics Laboratory. 1 Credit.

Visualization and verification of the concepts of fluid flow, pumps, turbines, and flow meters. 1 two-hour laboratory. Prereq: CE 309. F, S.

CE 316. Soil Mechanics. 3 Credits.

Principles of soil mechanics including three-phase composition, classification, effective stress, consolidation, shear strength, compaction, and site investigation. 2 lectures, 1 two-hour laboratory. Prereq: ME 222, ME 223. Co-req or Prereq: MATH 266.

CE 343. Structural Engineering and Analysis. 4 Credits.

Structural loading and analysis of statically determinate and indeterminate structures. Covers the elastic analysis and deformations of trusses, beams, and frames using force methods, displacement methods, matrix methods, and moment distribution. Prereq: ME 223.

CE 370. Introduction to Environmental Engineering. 3 Credits.

Introduction to various municipal and industrial pollutants being introduced into water, air, and land systems and their effects on the environment. Application of chemical, physical, and biological principles to the management of these pollutants. 3 one-hour lectures. Prereq: CE 309, CHEM 122.

CE 371. Environmental Engineering Laboratory. 1 Credit.

Water, wastewater, and solid waste analyses regarding their theory, objectives, and practices. Exposure to practical applications of the scientific and design theories presented in CE 370. 1 three-hour laboratory. Co-req: CE 370.

CE 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CE 391. Seminar. 1-3 Credits.**CE 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CE 394. Individual Study. 1-5 Credits.**CE 397. Fe/Coop Ed/Internship. 1-4 Credits.****CE 399. Special Topics. 1-5 Credits.****CE 403. Civil Engineering Materials II: Steel, Wood and Polymers. 2 Credits.**

Composition, properties, structure, and behavior of steel, wood, and polymeric materials; elastic, plastic, and viscous behavior under various environmental and loading conditions. Prereq: CE 303. {Also offered for graduate credit - see CE 603.}.

CE 404. Reinforced Concrete. 3 Credits.

Principles of design and analysis of reinforced concrete members, flexural and shear design of rectangular and tee beams, serviceability criteria, short and slender columns. 2 one-hour lectures, 1 two-hour session. Prereq: CE 343. F, S.

CE 405. Advanced Reinforced Concrete. 2 Credits.

Development and anchorage of reinforcement, details of reinforcement in flexural members, continuous beams and one-way slabs, slender columns, two-way slabs. 1 one-hour lecture, 1 two-hour session. Prereq: CE 404. F, S {Also offered for graduate credit - see CE 605.}.

CE 408. Water Resources and Supply. 3 Credits.

Hydrologic concepts, development of water supply sources, principles involved in the collection and transportation of water/wastewater/storm runoff, and distribution of water for municipal use. Prereq: CE 309. F, S.

CE 410. Water and Wastewater Engineering. 3 Credits.

Principles 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. 3 Credits.

System planning and demand forecasting; siting and geometric configuration of airports; aircraft characteristics; air traffic controls; standards for geometric design, airport pavement design, drainage and safety, pavement management and operations. Two-hour lectures and one-hour design session. Prereq: CE 418. Dual-listing: 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. 3 Credits.

System planning and demand forecasting; siting and geometric configuration of airports; aircraft characteristics; air traffic controls; standards for geometric design, airport pavement design, drainage and safety, pavement management and operations. two-hour lectures, one-hour design session. Dual-listing: 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 affine and metric spaces, kinematics of motion, general principles of continuum mechanics, thermodynamics of deformation, and postulates on constitutive laws. 3 one-hour lectures. Cross-listed with ME 720. F.

CE 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 AGECE 771.

CE 772. Rural Logistics and Distribution Management. 3 Credits.

Logistical systems and concepts, distribution management, management of railroads and motor carriers, and location of facilities. Includes agribusiness and natural resource case studies. Cross-listed with AGECE 772.

CE 776. Ground Water and Seepage. 3 Credits.

Groundwater as a resource, relation to hydrologic cycle, well hydraulics, seepage, ground water quality and contamination, ground water flow models. 3 one-hour lectures. S.

CE 778. Transportation Administration. 3 Credits.

Public organization behavior and administration, fund accounting, public budgeting, financial management, and strategic management of transportation agencies. Includes transportation case studies.

CE 779. Watershed Water Quality Modeling. 3 Credits.

Watershed characteristics, non-point source pollution and modeling, latest watershed-scale water quality modeling tools and software, hands-on applications.

CE 780. Transportation Planning. 3 Credits.

Types of transportation planning; history of urban and statewide transportation planning; development and trends in travel demand forecasting; trip generation, trip distribution, mode choice, traffic assignment; transportation plans for modal, and multi-modal alternatives; policy formulation and analysis. 1 three-hour lecture. S.

CE 781. Traffic Engineering. 3 Credits.

Traffic characteristics, studies, and control devices; operations analysis and design; aspects of signing, signalization, markings, and lighting; accident analysis; traffic laws and ordinances; work zone safety practices; arterial and freeway management. 1 three-hour lecture plus two-hour laboratory work. S.

CE 782. Introduction to Intelligent Infrastructure. 3 Credits.

Intelligent infrastructure and associated technologies for sensing, detection, and measurements used in civil infrastructure applications (can be applied to structure, transportation, and geotechnical engineering field).

CE 790. Graduate Seminar. 1-3 Credits.**CE 791. Temporary/Trial Topics. 1-5 Credits.****CE 793. Individual Study/Tutorial. 1-5 Credits.****CE 795. Field Experience. 1-15 Credits.****CE 796. Special Topics. 1-5 Credits.****CE 797. Master's Paper. 1-3 Credits.****CE 798. Master's Thesis. 1-10 Credits.****CE 892. Graduate Teaching Experience. 1-6 Credits.****CE 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 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 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 789. Corrosion and Electrochemical Systems. 3 Credits.

The course surveys fundamentals of corrosion and electrochemistry, aiming for students thorough understanding of corrosion thermodynamics, kinetics, characterization techniques, control strategies, and electrochemical systems: fuel cells, batteries, and electrodeposition. Student learning will be engaged through lectures, case studies, projects, and group discussions. Prereq: CPM 686.

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.

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 466. Human Factors in Artificial Intelligence. 3 Credits.

In an era where AI tools are becoming increasingly integrated into our daily lives, it is crucial to explore their impact on human communication and relationships. In this course, students will explore the ways in which artificial intelligence (AI) is being used to enhance and augment human communication and experiences. We will also grapple with the ethical considerations that arise and examine issues of fairness and transparency in AI systems and explore possibilities for mitigating these challenges through human-centered design. The overall goal of this class is to consider the increasing possibilities of artificial intelligence and how to use those possibilities to the better.

COMM 467. User Experience Research in Artificial Intelligence. 3 Credits.

With the increasing penetration of AI in the society, it is important to explore the intersection of artificial intelligence (AI) and user experience (UX). In this course, students will learn the knowledge and skills to evaluate user experience in AI-driven applications or systems with the goal to enhance the usability, transparency and trust in human-centered AI. The course will span across both theoretical and methodological dimensions of user experience research (UXR) in AI.

COMM 468. AI & Language Modeling. 3 Credits.

In this course, we'll study how the intersection of human language, human and computer cognition, and artificial intelligence shape and affect social, professional, and interpersonal interactions.

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, 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.

COMM 707. Quantitative Research Methods in Communication. 3 Credits.

Introduction to quantitative research planning and design, methods of research, and presentation of research results.

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 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.

COMM 899. Doctoral Dissertation. 1-15 Credits.

Community Development (CED)

CED 709. Foundations in Community Development. 3 Credits.

Introduces students in the on-line Master's degree program in community development to the on-line classroom environment, and to the science, practice, and profession of community development.

CED 711. Principles and Strategies of Community Change. 3 Credits.

Analyze theories, principles, strategies and practices of community change and development from a multidisciplinary perspective in order to construct a personal framework for the practice of community economic development. Prereq: CED 709.

CED 713. Community Development II: Organizing for Community Change. 3 Credits.

An examination of the role of civil society in community planning efforts, the connection between social relationships and economic activity, the structure and implications of power, conflict management, inclusiveness, and equitable change. Prereq: CED 709.

CED 715. Community Analysis: Introduction to Methods. 3 Credits.

An introduction to the research methods relevant to community development, strategies for reporting and applying findings in community action, and issues of research ethics and inclusiveness. Prereq: CED 709.

CED 717. Community and Regional Economic Policy and Analysis. 3 Credits.

Explores theories of economic growth, community economic and industrial base, sources of economic growth or decline, and strategies for local and regional economic development. Prereq: CED 709.

CED 719. Community Natural Resource Management. 3 Credits.

Theoretical frameworks, methodological investigation, and applied practices of natural resource development as a component of community economic development. Prereq: CED 709.

CED 721. Introduction to Native Community Development. 3 Credits.

Examines community development in the context of diverse tribal structures and cultures, and provides a holistic analysis of the unique histories and jurisdictional considerations of Native communities. Prereq: CED 709.

CED 723. Building Native Community/Economic Capacity. 3 Credits.

Non-Western approaches to helping Native communities build their economic capacity through participatory, culture-centered, and strength-based approaches to development. Prereq: CED 709.

CED 731. Ecological Economics. 3 Credits.

Examines the synthesis of ecology and economic utility through the inherent interdependence, jointness, and potential complementarity between the ecology and economy of a place. Prereq: CED 709.

CED 733. Sustainable Communities. 3 Credits.

Links the management of natural capital in communities and society to their implications for community sustainability in terms of economic vitality, social well-being, and ecosystem health. Prereq: CED 709.

CED 741. Economic Development Strategies and Programs. 3 Credits.

This course covers the most widely used strategies and programs for economic development within an action planning process, including retention and expansion of business and industry, retail development, downtown revitalization, incubating new firm creation, industrial attraction, and tourism development. Prereq: CED 709.

CED 745. Land Management Planning. 3 Credits.

Examines the principles and practices of real estate, including legal, economic, and social implications from the viewpoint of real estate practitioners, investors, and society. The course covers land use programs and methods of zoning. Prereq: CED 709.

CED 752. Basic Grant Development and Management. 3 Credits.

Introduces the grant development and management process, explores steps in the search for funding sources, examines program budgets and justifications, and lists plans for program sustainability. Prereq: CED 709.

CED 753. Not-for-profit Management. 3 Credits.

This course examines the unique management issues faced by not-for-profit community economic development organizations in terms of policy setting, participation, administration, and accountability. Prereq: CED 709.

CED 755. Community Leadership and Capacity Building. 3 Credits.

This course defines and applies leadership strategies to the community economic development context. The course examines the link between leadership and community capacity. Prereq: CED 709.

CED 756. Community Engagement. 3 Credits.

Provides foundational knowledge of community engagement, including community change readiness assessment, goal determination, and strategies to achieve change. Prereq: Students must be admitted to the GP-IDEA Community Development Master's degree program or have permission from the instructor.

CED 758. Evaluation of Organizations and Programs. 3 Credits.

Introduction to philosophy, techniques, and methodologies of organizational and program evaluation. Topics include overview of program evaluation and theory, techniques to evaluate program progress and performance, evaluation designs, assessing program efficiency, models to diagnose organizations, and methods to assess program performance. Prereq: Students must be admitted to the GP-IDEA Community Development Master's degree program or have permission from the instructor.

CED 761. Government, Politics, & Community Development. 3 Credits.

Introduction to classical and contemporary concepts of federalism, public administration, public policy, and politics with an emphasis on their bearing on community development activities and outcomes.

CED 763. Immigrants and Communities. 3 Credits.

Using current scholarship and primary data gathered by the students, this course examines community-immigrant interaction and how it influences community development and the human capital of immigrant inclusion. Prereq: The course is open first to students in the GP-IDEA Community Development program and secondly to other graduate students with the permission of the instructor.

CED 790. Graduate Seminar. 1-5 Credits.**CED 793. Individual Study/Tutorial. 1-5 Credits.****CED 798. Master's Thesis. 1-10 Credits.****CED 799. Master's Examination. 1-6 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 121. Artificial Intelligence for Everyone. 3 Credits.

This course provides an introductory overview of Artificial Intelligence (AI), covering fundamental concepts, techniques, and applications. Students will explore the history of AI, key algorithms, and current trends in the field. The course is designed to be accessible to students from various disciplines, requiring no prior knowledge of AI. By the end of the course, students will have a foundational understanding of AI and its impact on society.

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 170. Social Impacts of Artificial Intelligence. 3 Credits.

Introduction to social impacts of artificial intelligence, including on privacy, fairness, intellectual property, crime, and doomsday scenarios. The course is intended for a broad audience and does not have technical prerequisites.

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 105, CSCI 161, CSCI 213, 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. 3 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 770. Data Science Ethics. 3 Credits.

Introduction to ethics concepts that relate to the analysis and communication of data. Special emphasis is placed on fairness, privacy, and the social implications of data science.

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 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 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.

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. Prereq or Coreq: Admission to the Construction Management program.

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. Prereq or Coreq: Admission to the Construction Management program.

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 730. Construction Automation and Robotics. 3 Credits.

This course introduces current state of automation and robotics technologies in the architecture, engineering, and construction (AEC) industry. Students will explore foundational principles and examine how these technologies impact the design, construction, and operation of buildings and infrastructure. Through practical applications and implementation strategies, students will gain insight into technology's transformative role across construction project phases.

CM&E 740. Financial and Economic Concepts for Construction Managers. 3 Credits.

This course provides an advanced discussion of financial management and the economic appraisal of construction projects, including: accounting systems, financial documents, managing costs and cash flow, setting profit margins for bidding, time value of money, and economic evaluation of projects.

CM&E 770. Construction Organization Processes. 3 Credits.

The course provides an overview of critical management skills and the analysis of organizational management systems. Theories of motivation, planning, leadership, organizational interactions, etc. as they relate to construction operations.

CM&E 785. Advanced Project Engineering and Management. 3 Credits.

This course provides a discussion of advanced topics in construction project engineering and management. Topics include: Geographic Information Systems (GIS) applications in construction, front end planning, and forensic engineering.

CM&E 790. Graduate Seminar. 1-5 Credits.

CM&E 793. Individual Study/Tutorial. 1-5 Credits.

CM&E 795. Field Experience. 1-15 Credits.

CM&E 797. Master's Paper. 1-3 Credits.

CM&E 798. Master's Thesis. 1-10 Credits.

Counselor Education (CNED)

CNED 406. Psychopathology in the Health Professions. 3 Credits.

This course explores the history, causes, and common symptoms of mental health disorders, along with evidence-based treatment approaches. While some diagnostic frameworks may be discussed, the focus is on understanding psychological disorders from multiple perspectives rather than preparing students for diagnosis. Open to both students seeking a deeper understanding of abnormal behavior and mental health in the health professions. Meets criteria for the Foundations in Clinical Mental Health Certificate. May be repeated for credit. Prereq or Coreq: Junior standing or above. Dual-listing: CNED 606.

CNED 606. Psychopathology in the Health Professions. 3 Credits.

This course explores the history, causes, and common symptoms of mental health disorders, along with evidence-based treatment approaches. While some diagnostic frameworks may be discussed, the focus is on understanding psychological disorders from multiple perspectives rather than preparing students for diagnosis. Open to both students seeking a deeper understanding of abnormal behavior and mental health in the health professions. May be repeated for credit. Dual-listing: CNED 406.

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 705. Foundations of Mental Health Practice. 3 Credits.

Basic foundations of mental health practice including the history and current issues of mental health care, psychological issues, risk assessment, and basic listening techniques.

CNED 710. Counseling Techniques. 3 Credits.

Basic principles and techniques in the counseling process. Emphasis given to counseling techniques from several counseling orientations.

CNED 711. Counseling Theory. 3 Credits.

Study of various theories and philosophies of counseling and therapy.

CNED 712. Counseling Across the Lifespan. 3 Credits.

Application of personality theory and the life stages to human behavior, family dynamics, and the counseling process.

CNED 713. Assessment Techniques. 3 Credits.

Techniques and procedures of studying the individual and diagnostic process in identifying client issues. Prereq: CNED 710 and CNED 711 or instructor approval.

CNED 714. Career Counseling and Testing. 3 Credits.

Study of theories of career development and the use of career information and testing in career counseling. Prereq: Admission to program or instructor approval.

CNED 715. Professional Orientation and Ethics. 3 Credits.

Introduction to dealing with professional and ethical responsibilities and multicultural issues in the counseling field. Prereq: Admission to CNED program.

CNED 716. Social and Cultural Foundations of Counseling. 3 Credits.

Issues and trends in counseling with multicultural and diverse populations within our society. Prereq: CNED 710, CNED 711.

CNED 720. Group Counseling. 3 Credits.

Study of group counseling principles appropriate to various counseling settings including schools, treatment centers, and agencies. Includes a group experience. Prereq: Admission to Counselor Education program.

CNED 723. Psychopathology and Diagnosis for Counselors. 3 Credits.

Psychopathology, abnormal psychology and the diagnosis of mental and emotional disorders will be studied. The diagnostic process and nomenclature, treatment, referral and prevention of mental and emotional disorders across the lifespan will be examined. Prereq: Admission to program or instructor approval.

CNED 728. Guidance Administration and Consulting. 3 Credits.

Role of administrators, counseling personnel, and teachers in the management of and consulting in K-12 counseling programs. Prereq: Admission to program or instructor approval.

CNED 729. Professional K-12 School Counseling. 3 Credits.

Overview of principles and functions of a K-12 school counseling program, and examination of K-12 school counseling issues and resources. Prereq: CNED 728.

CNED 730. Crisis and Trauma in Counseling Practice. 3 Credits.

Students study various forms of trauma, personal violence, crisis, and disasters. Appropriate counseling strategies and interventions are emphasized. Prereq: CNED 710, CNED 711.

CNED 731. Counseling Children and Adolescents. 3 Credits.

Counseling with children and adolescents including specific counseling strategies; mental, physical, and emotional development issues related to counseling. Prereq: CNED 710, CNED 711.

CNED 732. Family Counseling. 3 Credits.

Principles and techniques of family counseling, study of family dynamics, family systems, and theories of family counseling. Prereq: CNED 710, CNED 711.

CNED 734. Dynamics of Addiction. 3 Credits.

Study of the theories and scope of addiction from both the personal and social viewpoints with consideration given to the impact on the family. Prereq: CNED 710, CNED 711.

CNED 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 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.

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 or Coreq: Criminal Justice majors or minors, Forensic Science minors, or by instructor permission.

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 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: CJ 201 or CJ 210. Prereq or coreq: Criminal Justice majors and minors, Forensic Science minors, Pre-Law minors, and Fraud Investigation minors, or instructor permission.

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: 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 695. Field Experience. 1-15 Credits.**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.**

Data Science (DATA)

DATA 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.

DATA 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 STAT 711.

DATA 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 STAT 712.

DATA 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 STAT 713.

DATA 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: STAT 714.

DATA 720. Programming for Data Science. 3 Credits.

This course introduces the foundations of programming for data science. It covers basics of programming in python and python tools for data acquisition, wrangling, analysis, and visualization. This course is for non-CS major students.

DATA 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 STAT 725.

DATA 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 STAT 726.

DATA 760. Applied Artificial Intelligence. 3 Credits.

Since Artificial intelligence (AI) is a very broad and diverse field that mimics human intelligence using computer programs and algorithms, an introduction to the field and the applied AI perspective will be discussed. Different AI techniques applied to different real-world problems will be the focus of the course.

DATA 761. Applied Machine Learning. 3 Credits.

This course is for Data Science students and will introduce applied machine learning methods (supervised and unsupervised learning) through the use of python packages. Topics will include classification algorithms and unsupervised clustering techniques. Prereq: DATA 720.

DATA 765. Applied Database Systems. 3 Credits.

Introduction to database systems focusing on relational database. The topics include Introduction to various database models, Data modeling, Database theory, Database design principles, SQL (structured query language) statement, Develop applications with database, and Database management. Prereq: DATA 720.

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 394. Individual Study. 1-5 Credits.

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 413.

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 793. Individual Study. 1-5 Credits.

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 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.

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 AGECE 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 784. Empirical International Trade and Policy. 3 Credits.

Empirical aspects of international trade, foreign investment, and the environment. Issues related to testing various trade models. Selected topics include testing trade models, gravity models, linkages between openness and growth, trade orientation and firm performance, trade patterns, trade and the environment, and labor markets and trade. Emerging topics in international economics with a focus on empirical applications. Use of advanced statistical modeling and data visualization techniques. Prereq: ECON 610 and AGECE 741 or equivalents. Cross-listed with AGECE 784.

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 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 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 740. Family & Community Engagement. 3 Credits.

An examination of theories and original research studies focused on mechanisms and roles of family engagement in student's educational processes in diverse social and cultural contexts. Systemic and integrated approaches to family engagement. An introduction to the Whole School, Whole Community, Whole Child model with a primary focus on fostering family and community engagement.

EDUC 741. Academic, Social, Emotional School Climates. 3 Credits.

This course is designed to provide professionals with an overview of key components of a learning environment where educators actively integrate social and emotional learning (SEL) strategies into the curriculum. Professionals will examine the roles of not only the academic expectations and instructional strategies but also the social interactions and emotional well-being of students, and their impact on the overall atmosphere within a learning environment.

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 797S. Comprehensive Project. 1-6 Credits.****EDUC 797. Master's Paper. 1-3 Credits.****EDUC 798S. Specialist Field Study. 1-3 Credits.****EDUC 798. Master's Thesis. 1-10 Credits.****EDUC 799. Master's Examination. 1-6 Credits.**

Literature review, research and preparation for the master's examination option.

EDUC 801. Foundations of Doctoral Scholarship. 3 Credits.

The expectations and responsibilities of doctoral scholars in the field of Education are examined. Expectations for knowledge acquisition, disciplined inquiry, and scholarly disposition are presented. Collegiality, collaboration, and ethical standards are emphasized. Prereq: Admission to Ed.D. program.

EDUC 802. Foundations of Educational Research. 3 Credits.

Examines various and diverse philosophical/theoretical frameworks, methodologies, techniques and designs for educational research. Explores the nature of educational research and the underpinnings of positivism/post-positivism, interpretive/constructivist and orientational paradigms with emphasis on reflective planning of studies. Prereq: admission to Doctoral program.

EDUC 803. Philosophical Foundations of Education. 3 Credits.

Through the examination of historical contexts and differing philosophical traditions within the field of education, students will reflect on and shape an informed and critical philosophy for their own scholarship and educational praxis. Admission to the Educational Doctoral Program is required.

EDUC 806. International and Comparative Education. 3 Credits.

The aim of this course is to add an international lens to our understanding of learning and education. Emphasizes globalization, comparative methods, policy, education as development, and analyzing teaching and learning within different national contexts.

EDUC 807. Diversity and Educational Policy. 3 Credits.

This course explores diversity in educational settings and investigates the purpose and implementation of educational policies related to access and services for diverse populations historically, presently, and in preparation for potential future needs.

EDUC 808. Empowerment & Transformative Education. 3 Credits.

An examination of theory, research and practice in individual and group transformation, empowerment, and advocacy development within multicultural and diverse learning contexts.

EDUC 811. Organizational Culture. 3 Credits.

This course examines organizational culture, including how culture is created, maintained, and changed through interaction. The course emphasizes deciphering organizational culture so that the decisions and actions taken by educational leaders will have greater impact on their organizations.

Prereq: Admission to doctoral program in Education or consent of the instructor.

EDUC 812. Leadership in Educational Institutions. 3 Credits.

This course provides an in-depth overview of contemporary and classic theories of organizational leadership, with specific attention to the application of existing theories to educational institutions. This course addresses the implications of leadership across contexts, cultures, and time with an emphasis on understanding and appreciating the challenges faced by leaders in modern educational institutions. Prereq: Admission to doctoral program in Education or consent of the instructor.

EDUC 813. Educational Innovation and Change. 3 Credits.

This course introduces the field of organizational change, including providing an overview and analysis of the change process and the various strategies for planning and implementing change. The course will emphasize the nature, characteristics, responsibilities, and contextual determinants that influence a leader's role in changing educational organizations. Prereq: Admission to doctoral program in Education or consent of the instructor.

EDUC 831. Institutional Quality Control. 3 Credits.

History and effecting of quality control will be briefly reviewed. Global, U.S. societal, state government, accreditation, and student accountability forces will be elucidated. Successful, failed, and future institutional responses to these forces will be discussed. Prereq: Admission to doctoral program.

EDUC 832. Assessment Techniques for Educational Institutions. 3 Credits.

This course addresses all aspects of educational assessments in order to select the assessment technique that meets specific accountability mandates in the field of education. Prereq: Admission to doctoral program.

EDUC 833. Strategic Planning for Institutional Improvement. 3 Credits.

The role of strategic planning in educational institutions and its relationship to institutional improvement and effectiveness will be explored. Approaches to implementation of strategic plans designed to address institutional goals will also be discussed.

EDUC 844. Higher Education Law. 3 Credits.

To develop expertise in legal issues for students whose current positions or future career goals include administrative and management positions in higher education where they will work on legal issues with attorneys. Prereq: Admission to doctoral program.

EDUC 851. Adult Learning. 3 Credits.

Contextual influences and theoretical perspectives specific to adult learning. Theories of adult growth and development. Physical and cognitive changes throughout adulthood and other factors that have implications for the learning and teaching of adults.

EDUC 852. Foundations of Occupational & Adult Education. 3 Credits.

This course explores the nature, function, and scope of occupational and adult education. The course provides both knowledge of the history of occupational and adult education and an appreciation of historical and philosophical perspectives.

EDUC 853. Instructional Methods for Adult Learners. 3 Credits.

This course provides educators with ways to understand adult learning and to facilitate the teaching and learning transaction through an array of methods. Emphasis is on the relationship of current research to contemporary practice.

EDUC 863. Education and Training for Business and Industry. 3 Credits.

The purpose of this course is to teach the fundamentals necessary to educate and train people for the workforce according to evolving training needs of business, industry, military and government. Prereq: Admission to doctoral program.

EDUC 871. Planning and Conducting Needs Assessment. 3 Credits.

A three-phase model will be compared and contrasted to provide the skill and knowledge necessary for conducting needs assessments for educational schools and institutions. Prereq: Admission to doctoral program.

EDUC 872. Qualitative Research Methods. 3 Credits.

This course introduces foundational theories and approaches to qualitative research for education settings, including the identification and critique of various types of qualitative research, data collection techniques, approaches to coding, analysis, interpretation, and write-up. Prereq: Admission to doctoral program.

EDUC 873. Case-Based Educational Research and Statistics. 3 Credits.

The purpose of this course is to have graduate students understand statistical meanings and concepts which will provide the professional expertise needed to serve schools and institutions with their contemporary research and accountability needs. Prereq: Admission to doctoral program.

EDUC 881. Computer Data Management and Decision Making. 3 Credits.

Interpretation of effective computer applications for computer use as a decision-making and planning tool for school finance and managerial functions relating to the field of school business administration and school district superintendency. Prereq: EDUC 730, 10 credits in Educational Administration.

EDUC 882. Institutional Analysis Techniques. 3 Credits.

Surveys, focus groups, longitudinal studies, national data sets, correct statistical design and analyses, and effective reporting techniques will be reviewed and utilized in depth to address questions of institutional performance in academic and student affairs. Prereq: Admission to doctoral program.

EDUC 883. Survey Research. 3 Credits.

The study of theory, method, and techniques for conceptualizing and conducting survey research will be explored including survey design, administration, and data management.

EDUC 884. Program Evaluation Research. 3 Credits.

Major theoretical approaches to the evaluation of educational programs are reviewed, analyzed, and critiqued. Pragmatic implications for educational and social policy are addressed, as well as constructive impact on program decision-making. Prereq: Admission to doctoral program.

EDUC 885. Structural Equation Modeling Fundamentals. 3 Credits.

Conceptual and mathematical foundations of structural equation modeling techniques will be presented. Application to education research including model specification, testing, and interpretation using appropriate software will be emphasized. Prereq: EDUC 873.

EDUC 886. Advanced Qualitative Research. 3 Credits.

Examines diverse theoretical frameworks, methodologies, techniques and designs for qualitative research. Further expands requisite knowledge and analysis skills needed for the completion of research projects employing qualitative methods and research procedures. Admission to the Educational Doctoral Program is required.

EDUC 890. Graduate Seminar. 1-5 Credits.**EDUC 892. Graduate Teaching Experience. 1-6 Credits.**

Graduate student teaching experiences for professional development. S/U grading.

EDUC 893. Individual Study/Tutorial. 1-5 Credits.**EDUC 894. Practicum/Internship. 1-8 Credits.****EDUC 896. Special Topics. 1-5 Credits.****EDUC 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.

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 or placement in MATH 105 or higher.

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 211. 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 165 with a grade of C or better. Coreq: MATH 129.

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 and Fourier transform in circuit analysis. 3 one-hour lectures, 1 two-hour laboratory. Prereq: ECE 211 and MATH 166 with a grade of C or better in both.

ECE 320. Electronics I. 4 Credits.

Characterization, modeling, and analysis of digital and analog circuits using diodes, BJTs, FETs, and Op Amps. 4 one-hour lectures, 1 two-hour laboratory each week for 10 weeks. Prereq: ECE 211.

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 265.

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 and MATH 266.

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 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. Prereq: ECE 211 and Junior standing.

ECE 403. Design II. 2 Credits.

Capstone experience in formulation and design of a system or device. 1 lecture. Prereq: ECE 401 and one of the following: ECE 320, ECE 374, ECE 375 or ECE 376.

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 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 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 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 648. Image Analysis I. 3 Credits.

Image acquisition, resolution, enhancement, restoration, and equalization. Illuminations, reflectance, and noise considerations. Segmentation, shape characterization, and object recognition. Simulation examples, computer problems, and gathering of actual scientific images via camera and computer. {Also offered for undergraduate credit - see ECE 448.}.

ECE 651. RF and Microwave Circuit Analysis and Design for Wireless Systems. 3 Credits.

This course will focus on the analysis and design of Radio Frequency (RF) and microwave circuits. In particular, circuits such as oscillators, filters, power dividers, amplifiers, mixers and modulators will be studied for wireless systems. {Also offered for undergraduate credit - see ECE 451.}.

ECE 653. Signal Integrity. 3 Credits.

Topics in system level signal integrity are presented. The construction and design of passive printed circuit cards are discussed, with computer aided design software used for analysis and class presentations. Circuit card fabrication issues and case examples of applications are discussed. F/2 {Also offered for undergraduate credit - see ECE 453.}.

ECE 655. Designing for Electromagnetic Compatibility. 3 Credits.

Principles and methods concerning electronic system designs that are not sources of or susceptible to electromagnetic interference. 3 lectures. Laboratory. F/2 {Also offered for undergraduate credit - see ECE 455.}.

ECE 661. Control Systems I. 4 Credits.

Modeling and control of dynamic systems, including root-locus, Bode plots, and Nichols charts. 3 lectures, 1 two-hour laboratory. {Also offered for undergraduate credit - see ECE 461.}.

ECE 663. Modern Control. 3 Credits.

Analysis and design of controllers for linear and non-linear systems using state-space methods. Design to specifications, controllability, observability, stability, optimization and state-estimation. 3 lectures. {Also offered for undergraduate credit - see ECE 463.}.

ECE 670. Fault Tolerant Digital Design. 3 Credits.

Design and analysis of reliable digital systems through robust information coding, fault avoidance, and fault-tolerance. 3 lectures. {Also offered for undergraduate credit - see ECE 470.}.

ECE 672. Design Automation of VLSI Circuits. 3 Credits.

Electronic design automation algorithms utilized by software tools, which are used for the design automation of VLSI integrated circuits. This course will cover design steps including circuit synthesis, technology mapping, formal verification, floorplanning, placement, and routing. {Also offered for undergraduate credit - see ECE 472.}.

ECE 674. Computer Architecture. 3 Credits.

Processor operations, computer arithmetic, control mechanism, instruction sets, classification schemes, pipelining, parallel processing, hierarchical memory and memory management, I/O methods and interrupts, and interconnection buses. 3 lectures. {Also offered for undergraduate credit - see ECE 474.}.

ECE 675. Advanced Digital Design. 4 Credits.

Master advanced logic design concepts, including the design and testing of synchronous and asynchronous combinational and sequential circuits using state of the art CAD tools. 3 lectures, 1 two-hour laboratory. {Also offered for undergraduate credit - see ECE 475.}.

ECE 676. Advanced Embedded Systems. 4 Credits.

Specification, design, development, and test of modern embedded systems using a high-level programming language. 3 lectures, 1 two-hour laboratory. {Also available for undergraduate credit, See ECE 476.}.

ECE 677. Hardware Design for Machine Learning. 3 Credits.

Hardware-aware neural network (NN) design in NVidia Developer kit with OpenCV python programming. MAC design for NN and alternate neural network implementations using emerging technologies. Advanced topics in Hardware-aware neural network designs such as Binary nets, FFT-based neural nets, In-compute Memory and near-compute memory. 2 lectures, 1 two-hour laboratory. {Also offered for undergraduate credit - See ECE 477.}.

ECE 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. Advanced Engineering Problem Solving. 3 Credits.**

Application of advanced mathematical and computational methods to engineering problems. 3 lectures. S.

ECE 702. Advanced Research Topics. 1 Credit.

Prepare the student in finding a major adviser; defining the research questions or objectives; beginning a literature search; learning how to prepare a manuscript and/or grant application with their major adviser. F.

ECE 703. Advanced Teaching and Classroom Topics. 1 Credit.

To help prepare the Ph.D. student for the challenge of teaching in a classroom. F.

ECE 705. Stochastic Processes. 3 Credits.

Random variables, probability bounds, random vectors, random sequences, stochastic processes, and statistical signal processing.

ECE 713. Introduction to Lab-on-a-Chip Technology. 3 Credits.

This course introduces the fundamentals of Lab-on-a-chip technology. It also provides a comprehensive picture of instruments, tools and techniques used in various aspects of Lab-on-a-chip technology. Finally, some applications in biomedical engineering will be discussed.

ECE 721. Integrated Circuits. 3 Credits.

Introduction to CMOS circuits. Circuit characterization and performance estimation. CMOS circuit and logic design, CMOS testing. CMOS subsystem design. 3 lectures. Prereq: ECE 623.

ECE 722. Wireless IC Design. 3 Credits.

Basic concepts of wireless IC design. Various radio transceiver architectures and its application. Design of CMOS radio transceiver circuit blocks. Hands-on-experience on IC design and layout using industry-based chip design software Cadence. Prereq: ECE 621.

ECE 723. Advanced Electronics. 3 Credits.

Characteristics and detailed modeling of operational amplifiers. Applications to waveform generation, analog multiplication, modulation, and data conversion. IC and special amplifiers. 3 lectures. Prereq: ECE 621. (alternate years).

ECE 726. Advanced VLSI Design. 3 Credits.

This course covers state-of-the-art design techniques for VLSI at device, circuit, architecture, and application levels. Prereq: ECE 423 or ECE 623.

ECE 731. Power System Protection. 3 Credits.

Power system protective relaying. Generator, transformer, line, bus, motor protection. 3 lectures. Coreq: ECE 633. S.

ECE 733. Power Distribution. 3 Credits.

Power distribution systems. Lines and transformers, characteristics of loads, voltage drops and corrective measures, lightning protection. Fault analysis, fuses, reclosers, sectionalizers. Power system harmonics and power quality. 3 lectures. Coreq: ECE 631. F.

ECE 734. Modeling and Control of High Voltage Direct Current (HVDC) Systems. 3 Credits.

The course covers fundamentals of modeling, analysis and control of LCC and VSC HVDC systems. Applications integrating renewable energy will also be studied. Prereq: ECE 631.

ECE 737. Advanced Power Electronics. 3 Credits.

The course teaches the characteristics and detailed design of power semiconductors, power conversion topologies and controls, passive component design and selection, and advanced control strategies for DC-DC converters and DC-AC Inverters. 3 lectures Prereq: ECE 637.

ECE 741. Signal Processing I. 3 Credits.

Analysis and design of discrete- and continuous time signals and systems. Advanced treatment of transform techniques and Fourier analysis. Classical filter design techniques. Fast Fourier transform algorithms and applications. 3 lectures. Prereq: ECE 643.

ECE 743. Signal Processing II. 3 Credits.

Discrete-time Wiener and Kalman filtering. Least squares signal processing and filter design. Spectral analysis. Adaptive signal processing. 3 lectures. Prereq: ECE 741. S.

ECE 745. Statistical Communications. 3 Credits.

Advanced topics in communications theory including detection theory, estimation theory, and information theory. 3 lectures. Prereq: ECE 643. S.

ECE 748. Elements of Information Theory. 3 Credits.

This course will cover: entropy, asymptotic equipartition property, data compression, channel capacity, differential entropy, the Gaussian channel, an introduction to rate distortion theory and network information theory.

ECE 749. Wireless Communication. 3 Credits.

Wireless channel model, design of transmission and reception techniques for wireless communication systems and their performance analysis.

ECE 751. Electromagnetic Theory and Applications. 3 Credits.

Theory of radiation, antenna characteristics, complex waves, potential functions and spectral domain methods for wave guides and cavities, and dispersive media. 3 lectures. S/2.

ECE 755. Advanced Topics in Electromagnetics. 3 Credits.

Topics of current interest in electromagnetics, microwaves, and optics. 3 lectures. Prereq: ECE 751. S/2.

ECE 761. Advanced Control Theory I. 3 Credits.

State variable formulation of the control problem; system identification. Introduction to adaptive, distributed, multivariable, nonlinear, optimal, and stochastic control.

ECE 772. Low Power Circuit and System Design. 3 Credits.

This course will cover state-of-the-art design techniques for low power digital circuits and systems at device, circuit, architecture, system, and application levels.

ECE 775. Hardware For Cryptography. 3 Credits.

This course covers the mathematical background, modern cryptographic techniques like block ciphers, hash functions and public-key cryptosystems. Hardware and embedded implementations of cryptosystems and recent research in hardware implementation are also covered. Prereq: CSCI 669.

ECE 776. Software and Hardware for Cloud Computing. 3 Credits.

The course will focus on the architectural components of cloud computing systems with particular emphasis on service delivery models and management of cloud environment and services. Prereq: ECE 774.

ECE 777. System Level Design and Automation. 3 Credits.

Background, useful abstractions and needed techniques for system-level modeling, performance analysis, synthesis and optimization. Emphasis is on both computation and communication aspects involved in the Systems-On-Chip design of embedded applications.

ECE 787. Advanced Cardiovascular Engineering III. 3 Credits.

Advanced research topics in multi-scale cardiac modeling such as ventriculo-arterial coupling, organ-level characterization, tissue characterization, cellular properties, and sub-cellular processes culminating in a grant proposal. Prereq: ECE 687 and ECE 688.

ECE 788. Advanced Cardiovascular Engineering IV. 3 Credits.

Advanced research topics in multi-scale cardiac modeling such as ventriculo-arterial coupling, organ-level characterization, tissue characterization, cellular properties, and sub-cellular processes culminating in a research journal manuscript or conference proceeding. Prereq: ECE 787.

ECE 790. Graduate Seminar. 1-3 Credits.**ECE 791. Temporary/Trial Topics. 1-5 Credits.****ECE 793. Individual Study/Tutorial. 1-5 Credits.****ECE 795. Field Experience. 1-15 Credits.****ECE 796. Special Topics. 1-5 Credits.****ECE 797. Master's Paper. 1-3 Credits.****ECE 798. Master's Thesis. 1-10 Credits.****ECE 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.

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 301. 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.

ENGR 302. 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: ENGR 301.

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 Credit.****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 through reflection on the dynamics of online education itself. Prereq: ENGL 120.

ENGL 458. Advanced Writing Workshop. 3 Credits.

Writing, revising, and editing projects based on rhetorical principles. Frequent response from peers and instructor. Analysis of selected readings and students' own writing. Prereq: Any one of the following: ENGL 320, ENGL 321, ENGL 322, ENGL 323, ENGL 324, ENGL 325, ENGL 326 or ENGL 358.

ENGL 459. Researching and Writing Grants and Proposal. 3 Credits.

A rhetorical approach to researching and writing academic grants, business proposals, and related professional documents. Students develop a portfolio of professionally designed and edited documents as well as the vocabulary of grants writing and research. Prereq: ENGL 120 and Junior standing. {Also offered for graduate credit - see ENGL 659.}.

ENGL 467. English Studies Capstone Experience. 3 Credits.

Cumulative and integrative study for English majors of English language, literature, and composition. Prereq: ENGL 272.

ENGL 472. 20th Century American Writers. 3 Credits.

Intensive study of major American writers from 1900 to 1950. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 672.}.

ENGL 474. Native American Literature. 3 Credits.

The development of literature by and about Native Americans is traced from 1850 to the present. Focus on Native American identity and contributions to the American culture. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 674.}.

ENGL 476. Topics in American Literature. 3 Credits.

Intensive study of a special theme, form, period, or group of writers central to the formation and development of American literature. May be repeated with change of topic. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 676.}.

ENGL 480. Medieval Literature. 3 Credits.

British poetry and prose from the beginning of the Middle Ages to 1500, excluding Chaucer. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 680.}.

ENGL 482. Renaissance Literature. 3 Credits.

Study of British writers of the 16th and 17th centuries. Prereq: ENGL 272. {Also offered for undergraduate credit - see ENGL 682.}.

ENGL 483. Topics in British Literature. 3 Credits.

Intensive study of a special theme, form, period, or group of writers central to the formation of British literature. May be repeated with change of topic. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 683.}.

ENGL 486. Romantic Literature. 3 Credits.

Study of major British writers from the French Revolution to the coronation of Queen Victoria. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 686.}.

ENGL 491. Seminar. 1-5 Credits.**ENGL 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENGL 493. Undergraduate Research. 1-5 Credits.**ENGL 494. Individual Study. 1-5 Credits.****ENGL 496. Field Experience. 1-15 Credits.****ENGL 499. Special Topics. 1-5 Credits.****ENGL 635. Young Adult Literature in a Multicultural World. 3 Credits.**

Introduction to the field of Young Adult Literature (YAL) with an emphasis on multicultural novels. Recommended for English Education majors, English majors seeking breadth in their reading, and students seeking diverse reading. {Also offered for undergraduate credit - see ENGL 435.}.

ENGL 649. Usability and User Experience. 3 Credits.

This course 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 701. Insect Pest Identification and Management: Corn & Wheat. 1 Credit.**

This course provides information about common insect/arthropod pests of corn and wheat in the upper Great Plains of the U.S. It's primarily intended for students with applied interests in entomology, farming, crop consulting, or land management. Topics include insect/arthropod pest identification, biology, feeding damage, and integrated pest management strategies.

ENT 702. Insect Pest Identification and Management: Soybean & Pulses. 1 Credit.

This course provides information about common insect/arthropod pests of soybean and pulses in the upper Great Plains of the U.S. It's primarily intended for students with applied interests in entomology, farming, crop consulting, or land management. Topics include insect/arthropod pest identification, biology, feeding damage, and integrated pest management strategies.

ENT 703. Insect Pest Identification and Management: Potatoes & Oilseeds. 1 Credit.

This course provides information about common insect/arthropod pests of potatoes and oilseeds (sunflower) in the upper Great Plains of the U.S. It's primarily intended for students with applied interests in entomology, farming, crop consulting, or land management. Topics include insect/arthropod pest identification, biology, feeding damage, and integrated pest management strategies.

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 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 781. Overview of Entomology. 3 Credits.

This course provides basic information about Entomology and is intended to provide an overview of the topic for students of varying academic and/or career interests who have not previously had a general Entomology class. Topics include: arthropod (i.e., insects and their relatives) taxonomy and identification, arthropod structure and function, and how arthropods interact in multiple contexts.

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 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.

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 770. Environmental Law and Policy. 3 Credits.

Introduction of major federal and state statutes and regulatory programs that governs environmental quality, pollution control and wildlife management, including legislative enactment, regulatory development, enforcement, federal/state relationship and judicial interpretation.

ECS 790. Graduate Seminar. 1-3 Credits.**ECS 797. Master's Paper. 1-5 Credits.****ECS 798. Master's Thesis. 1-10 Credits.****ECS 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.

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. Prereq or Coreq: Restricted to College of Business major, minor or certificate 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. Prereq or Coreq: College of Business major, minor or certificate and a 2.50 minimum NDSU grade point average. Dual-listing: 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. Prereq or Coreq: College of Business major, minor or certificate and a 2.50 minimum NDSU grade point average. Dual-listing: 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. Prereq or Coreq: College of Business major, minor or certificate and a 2.50 minimum NDSU grade point average. Dual-listing: 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: College of Business major, minor or certificate 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. Prereq or Coreq: College of Business major, minor or certificate 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. Prereq or Coreq: College of Business major, minor or certificate and a 2.50 minimum NDSU grade point average.

FIN 461. 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. Prereq or Coreq: Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. Cross-listed with SCM 461. Dual-listing: SCM 661 FIN 661.

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. Prereq or Coreq: College of Business major, minor or certificate and a 2.50 minimum NDSU grade point average. Dual-listing: 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. Prereq or Coreq: College of Business major, minor or certificate and a 2.50 minimum NDSU grade point average. Dual-listing: 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 661. 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. Cross-listed with SCM 661. Dual-listing: SCM 461 FIN 461.

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.

Overview of U.S. federal and state laws and international food standards with emphasis on U.S. federal regulatory agencies. Cross-listed with AGECE 452 and CFS 452. Dual-listing: CFS 652 AGECE 652 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.**

Overview of U.S. federal and state laws and international food standards with emphasis on U.S. federal regulatory agencies. Cross-listed with AGECE 652 CFS 652. Dual-listing: CFS 452 AGECE 452 SAFE 452.

SAFE 684. Food Safety Practicum. 1-3 Credits.

Supervised experience to give students hands-on practice at addressing food safety problems. Placement with industry, government or academic settings will be arranged. Program permission required for registration. May be repeated for credit. {Also offered for undergraduate credit - see SAFE 484.}.

SAFE 720. Food Safety Costs and Benefits Analysis. 3 Credits.

Theoretical and empirical impacts of food safety costs and benefits. Three lectures. Prereq: SAFE 670, AGECE 741. Cross-listed with AGECE 720.

SAFE 725. Food Policy. 3 Credits.

Provides quantitative tools and models used to analyze general food safety policies. Three lectures. Prereq: SAFE 670. Cross-listed with AGECE 725 and CFS 725.

SAFE 753. Food Toxicology. 2 Credits.

Discussions on the properties of toxic substances found both naturally and as contaminants in foods, the hazards they present to humans and their food supplies, and ways to reduce risks.

SAFE 785. Advanced Crisis Communication. 3 Credits.

Long- and short-term issues for managing communication related to organizational crises are discussed in the stages of pre-crisis, crisis and post-crisis.

SAFE 786. Risk Communication. 3 Credits.

Explores the relationship between communication strategies and risk perception, assessment, and management. Cross-listed with COMM 786.

SAFE 790. Graduate Seminar. 1-3 Credits.**SAFE 791. Temporary/Trial Topics. 1-5 Credits.****SAFE 793. Individual Study/Tutorial. 1-5 Credits.****SAFE 794. Practicum/Internship. 1-10 Credits.****SAFE 795. Field Experience. 1-15 Credits.****SAFE 796. Special Topics. 1-5 Credits.****SAFE 797. Master's Paper. 1-3 Credits.****SAFE 798. Master's Thesis. 1-10 Credits.****SAFE 899. Doctoral Dissertation. 1-15 Credits.**

Geographic Information Systems (GIS)

GIS 455. Introduction to Geographic Information Systems. 3 Credits.

Application of the principles of geographic information systems and integrally related mapping to solve problems related to environment site characterizations, resource exploration, soil and groundwater contamination, geological and geotechnical investigations, waste management, construction, etc. Comprehensive lab assignments included to give students hands-on experience solving problems with current state-of-the-art software and hardware, digitizers, scanners, and GPS units. Dual-listing: GIS 655.

GIS 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: GIS 455. Dual-listing: GIS 656.

GIS 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 470. Dual-listing: GIS 670.

GIS 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: GIS 455. Cross-listed with GEOL 480. Dual-listing: GIS 680.

GIS 655. Introduction to Geographic Information Systems. 3 Credits.

Application of the principles of geographic information systems and integrally related mapping to solve problems related to environment site characterizations, resource exploration, soil and groundwater contamination, geological and geotechnical investigations, waste management, construction, etc. Comprehensive lab assignments included to give students hands-on experience solving problems with current state-of-the-art software and hardware, digitizers, scanners, and GPS units. Dual-listing: GIS 455.

GIS 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, hydrological analyses, risk assessment, policy making, disaster response and strategic defense techniques. Comprehensive lab assignments will give students hands-on experience solving problems with current state-of-the-art software and hardware, digitizers, scanners, and GPS units. Prereq: GIS 655. Dual-listing: GIS 456.

GIS 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. Dual-listing: GIS 470.

GIS 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: GIS 655. Cross-listed with GEOL 680. Dual-listing: GIS 480.

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 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, GEOL 665.

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 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, GEOL 465.

GEOG 696. Special Topics. 1-5 Credits.

Geology (GEOL)

GEOL 105L. Physical Geology Lab. 1 Credit.

Study of the Earth as a physical body; its structure, composition, and the geologic processes acting on and within the Earth.

GEOL 105. Physical Geology. 3 Credits.

Study of the Earth as a physical body; its structure, composition, and the geologic processes acting on and within the Earth.

GEOL 106. The Earth Through Time. 3 Credits.

Introduction to the Earth through time; its origin, history, and evolution of animal and plant life.

GEOL 106L. The Earth Through Time Lab. 1 Credit.

Introduction to the Earth through time; its origin, history, and evolution of animal and plant life.

GEOL 107L. Geology of 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, GEOG 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, GEOG 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.

Global Studies (GLBL)

GLBL 110. Introduction to Global Studies. 3 Credits.

An interdisciplinary course which introduces students to a variety of global topics, concepts, and perspectives.

GLBL 311. Global to Personal Wellbeing. 3 Credits.

This course will take a sociological approach to understand how people use and act within their environment, in both nature and urban settings and how this impacts their own wellness practices. Students will learn how to incorporate wellbeing practices into their academic, personal, and professional lives. Global experience will be a required component of this course.

GLBL 330. Globalization and the Digital Age. 3 Credits.

This course will explore how new tools and capabilities in the digital revolution have impacted all aspects of global society. The course will focus on the causes and impacts of the digital divide, the effects of digital culture on the individual and society, as well as the ways in which institutions and global systems are operating and transforming in this era. It will examine both the challenges and opportunities presented in education, labor, security, and safety. Additionally, it will look at the psychological, socio-cultural, and environmental impact of digital life and social media globally.

GLBL 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.

GLBL 394. Individual Study. 1-5 Credits.**GLBL 397. Fe/Coop Ed/Internship. 1-15 Credits.****GLBL 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.

GLBL 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 for credit. Prereq or coreq: Prior approval by International Student and Study Abroad Services.

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).

GLBL 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).

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 175. Sport in the Ancient World. 3 Credits.

This course surveys the history of sport and physical activity in the ancient world, focusing on ancient Greek and Roman societies. The class will concentrate on two basic areas of physical activity. The course will explore the history of sports and the history of ideas and beliefs about physical activity and human nature.

HNES 194. Individual Study. 1-5 Credits.**HNES 196. Field Experience. 1-15 Credits.****HNES 199. Special Topics. 1-5 Credits.****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 261L. Food Selection and Preparation Principles Laboratory. 2 Credits.

Illustrates and extends lecture topics and stresses practical application of scientific food preparation principles.

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 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 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 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 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 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 361. Foodservice Systems Management I. 3 Credits.

Principles and methods of purchasing, production, and management for quantity foodservice operations.

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 396. Field Experience. 1-15 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 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 442L. Community Health and Nutrition Laboratory. 3 Credits.

Application of nutrition education and program development in community settings. Coreq: HNES 442. {Also offered for graduate credit - see HNES 642L.}.

HNES 442. Community Health and Nutrition Education. 3 Credits.

Nutrition education in community settings. Topics include behavior change, education and counseling theory, needs assessment, planning, implementation, and evaluation in a community setting. Prereq: HNES 251. {Also offered for graduate credit - see HNES 642L.}.

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 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 465L. Exercise Physiology Laboratory. 1 Credit.

Laboratory exercises to test aerobic and anaerobic capacity, strength, body composition, and dietary analysis. Coreq: HNES 465.

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 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 468L. Foodservice Systems Management II Laboratory. 1 Credit.

Supervised practice for CPD students in foodservice to accompany HNES 468/668.

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 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 468L.

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 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 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 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 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 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 GPIEA 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 740. Maternal and Child Nutrition. 3 Credits.

Behavioral, physiological and public health issues impacting dietary and nutritional factors that support normal growth and development. Focuses on the early stages of the life cycle: gestation, lactation, infancy, preschool, school age and adolescence.

HNES 741. International Nutrition. 3 Credits.

Presents major nutritional problems that influence the health, survival, and developmental capacity of populations in developing societies. Covers approaches implemented at the household, community, national, and international levels to improve nutritional status.

HNES 742. Nutrition: A Focus on Life Stages. 3 Credits.

The influence of normal physiological stresses on nutritional needs throughout the life span will be explored. Evaluating nutritional status at different stages of life and identifying appropriate needs and services will be included.

HNES 743. Obesity Across the Lifespan. 3 Credits.

This course emphasizes obesity in a population from childhood to the adult with attention to the impact of obese conditions on disease development throughout the life cycle.

HNES 744. Dietary and Herbal Supplements. 3 Credits.

Explore the safety and efficacy of botanical/herbal and dietary supplements in health applications including dietary supplementation in the prevention and treatment of chronic illness.

HNES 746. Nutrition and Health Disparities. 3 Credits.

This course is an examination of nutrition and health disparities in the U.S. Identification of sociocultural determinants of health and their influence on nutrition and health outcomes. Exploration of interdisciplinary strategies to reduce nutrition and health disparities.

HNES 747. Understanding Food Culture. 3 Credits.

This course is designed as a survey of topics that affect how we perceive food in the modern world. Food is examined as a badge of cultural identity, a focus of media scrutiny and promotion, a symbol of religion, and a driver of technology.

HNES 748. Nutritional Epidemiology. 3 Credits.

Methods and issues involved in understand and conducting studies on the relationship between human diet and disease. Recommended: graduate level statistics course.

HNES 750. Advanced Human Nutrition: Macronutrients. 3 Credits.

Physiological and biochemical aspects of macronutrients of human nutrition.

HNES 751. Metabolism of Micronutrients. 3 Credits.

This course focuses on nutrition that integrates mechanisms and interactions of vitamins and minerals from the cellular level, through the integration and regulation of metabolism in the whole organism.

HNES 752. Phytochemicals. 3 Credits.

Overview of phytochemicals (non-nutritive biologically active compounds) from fruits, vegetables, cereals and oilseeds with implications related to chemistry, physiological functions, and potential health implications.

HNES 753. Nutrigenomics and Advanced Lipid Metabolism in Human Nutrition. 3 Credits.

Concepts of how nutrients regulate gene expression (nutrigenomics) and how an individual's genotype influences their nutrient requirements (nutrigenetics). This course will focus on the unique role of lipids in nutritional genomics and chronic disease. Students must be enrolled in the M.S. in Dietetics program (GPIDEA).

HNES 754. Assessment in Nutrition and Exercise Science. 3 Credits.

Techniques to assess nutritional status, physical fitness status and how to interpret the information received.

HNES 756. Pediatric Clinical Nutrition. 3 Credits.

The physiological, biochemical and nutritional aspects of disease processes relevant to infants and children up to 18 years of age, including inborn errors of metabolism, food hypersensitivity, obesity, and diseases of the major organ systems. Prereq: HNES 755.

HNES 757. Nutritional Aspects of Oncology. 3 Credits.

Basic cancer biology and the relationship between nutrition and cancer, the role of nutrition in specific cancers, and information for cancer prevention programs and how to apply this information in patient management.

HNES 758. Clinical Aspects of Nutrition Support. 3 Credits.

Specialized nutrition assessment and support. Review of energy expenditure and substrate utilization in disease states. Methods for the initiation and management of enteral and parenteral nutrition therapy. Evaluation of nutrition support selected disease states.

HNES 759. Nutrition and Immunology. 3 Credits.

Principles and issues related to nutrition and immunology. Impact of nutrients and nutritional status on immune responses. Impact of disease states on nutritional status.

HNES 760. Skeletal Muscle Physiology. 3 Credits.

This course is designed to provide students with an in-depth analysis of the structure and function of skeletal muscle. Course material ranges from skeletal muscle microanatomy and physiology to advanced topics in neuromuscular physiology.

HNES 761. Physiological and Fitness Assessment in Exercise Science. 3 Credits.

Instruction and practical guidelines of different physiological and fitness assessments in exercise science.

HNES 762. Exercise Endocrinology. 3 Credits.

A comprehensive review of the endocrine system with a specific emphasis on the hormonal response to exercise. 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 770. Evidence Based Research and Practice. 2 Credits.

This course introduces students to current evidence based research methods and the importance of conducting and interpreting athletic training research. Prereq: HNES 780.

HNES 772. Prevention and Health Promotion in Athletic Training. 2 Credits.

General nutrition, prevention and health promotion concepts, and psychosocial and mental health aspects in athletic training. Prereq: HNES 770.

HNES 773. Athletic Training Capstone. 2 Credits.

Comprehensive review of patient case scenarios using evidence-based practice for clinical integration as a healthcare professional. Prereq: HNES 774, HNES 776.

HNES 774. Therapeutic Exercise. 3 Credits.

Therapeutic interventions involving rehabilitative techniques, equipment, and activities using body movements to enhance function, prevent impairments and activity restrictions to maximize participation and health-related quality of life.. Prereq: HNES 782.

HNES 775. Therapeutic Modalities. 3 Credits.

Therapeutic interventions involving contemporary modalities to prevent and treat orthopedic injuries to restore and enhance function and maximize participation and health-related quality of life. Prereq: HNES 770.

HNES 776. Non-Orthopedic Assessment. 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 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.

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. May be repeated for credit.

HPER 116. Billiards. 1 Credit.

Basic technique and practice of billiards. May be repeated for credit.

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. May be repeated for credit.

HPER 130. Rock Climbing. 1 Credit.

Basic technique and practice of rock climbing. May be repeated for credit.

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. May be repeated for credit.

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. May be repeated for credit.

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 793. Individual Study/Tutorial. 1-5 Credits.****HPER 794. Practicum/Internship. 1-8 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 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 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 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: HIST 638, ANTH 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 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: HIST 438, ANTH 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 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.

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. Advising FFA and SAE. 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. Dual-listing: 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, EDUC 486, H&CE 232, H&CE 341. For AGED: H&CE 444, H&CE 481. For FACS: H&CE 468, H&CE 482. Coreq: H&CE 487. {Also offered for graduate credit - see H&CE 683P.}.

H&CE 487. Student Teaching. 9 Credits.

Supervised teaching in an approved and accredited school. Includes an on-campus seminar. Prereq: EDUC 489, EDUC 451, EDUC 486, H&CE 232, H&CE 341. For AGED: H&CE 444, H&CE 481. For FACS: H&CE 468, H&CE 482. Coreq: H&CE 483. {Also offered for graduate credit - see H&CE 687P.}.

H&CE 488. Applied Student Teaching. 3 Credits.

Guided student teaching experience including application of lesson planning, portfolio development, professional goal-setting, and supervised teaching in an approved and accredited school. Prereq: Admission to School of Education, completion of professional education sequence. Coreq: EDUC 485 or H&CE 483P, EDUC 487. Cross-listed with H&CE 488. {Also offered for graduate credit - see H&CE 688P.}.

H&CE 491. Seminar. 1-5 Credits.**H&CE 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

H&CE 494. Individual Study. 1-5 Credits.**H&CE 496. Field Experience. 1-15 Credits.****H&CE 499. Special Topics. 1-5 Credits.****H&CE 644. Advising FFA and SAE. 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. Dual-listing: H&CE 444.

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 with Technology. 3 Credits.

This course will prepare educators in formal and non-formal settings to use technology as a tool in their learning environment 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 792. Graduate Teaching Experience. 1-6 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 892. Graduate Teaching Experience. 1-6 Credits.****H&CE 893. Individual Study/Tutorial. 1-5 Credits.**

Human Development & Family Science (HDFS)

HDFS 140. Navigating Technology and Family Life. 3 Credits.

Examination of the use and impact of information and communications technologies on families. Emphasis on the intentional use of technologies to support family well-being.

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 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.

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 797S. Comprehensive Project. 1-6 Credits.****HDFS 797. Master's Paper. 1-3 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 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 metallic and non-metallic engineering materials. Prereq: IME 430 and ME 331. {Also offered for graduate credit - see IME 637.}.

IME 440. Engineering Economy. 3 Credits.

Capital investment decision foundation within rules of general and project accounting. Analysis of benefits and returns against cost for engineering installation, operation, life cycle and make-or-buy decisions. Prereq or Coreq: Junior standing. Dual-listing: 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.

Collection, analysis, evaluation, and presentation of engineering and scientific data, SPC, Sampling, Descriptive Statistics, Discrete and Continuous statistical distributions, Estimation Procedures, Hypothesis Testing, Linear Regression and ANOVA. Prereq: MATH 166. Dual-listing: 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.

This course covers foundational ML topics, including linear and multiple regression, Lasso and Ridge regression, gradient descent, classification methods (kNN, decision trees, random forests, logistic regression), clustering techniques (k-means, k-modes, agglomerative clustering), neural networks (feedforward networks and backpropagation), and applications of large language models (LLMs). Selected engineering machine learning applications will be explored, and the role of responsible AI in contemporary technological advancements will be discussed. 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 484. Scheduling Methods. 3 Credits.

Concepts, methods, and results of scheduling theory. Modern sequencing and scheduling applications in industrial and manufacturing systems. Optimization methods, algorithms, and heuristic procedures to solve practical scheduling problems such as single machine, parallel machines, job families and batches, flow shop, and job shop. Prereq or Coreq: Junior Standing. Dual-listing: IME 684.

IME 485. Industrial and Manufacturing Facility Design. 3 Credits.

Capstone integration of analysis and design tools to convert product design into production plans and plants. Prereq: Senior standing. {Also offered for graduate credit - see IME 685.}.

IME 489. Industrial and Manufacturing Engineering Capstone. 3 Credits.

Capstone experience. Student projects in design, analysis, and experimental investigation related to industrial and manufacturing engineering. Prereq: IME 482 and senior standing with less than 36 hours of required class work to graduate.

IME 491. Seminar. 1-5 Credits.**IME 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

IME 493. Undergraduate Research. 1-5 Credits.

Student research, scholarly project or creative investigation completed under the guidance of a faculty mentor. Directed independent project, collaborative work or ongoing participation in faculty research should culminate in a presentation, article or scholarly project.

IME 494. Individual Study. 1-5 Credits.**IME 496. Field Experience. 1-15 Credits.****IME 499. Special Topics. 1-5 Credits.****IME 611. Human Factors Engineering. 3 Credits.**

A survey of human factors engineering topics with an emphasis on optimizing person-machine and person-system interactions. Human physical and cognitive capabilities will be investigated to improve work design, interface design, and usability. {Also offered for undergraduate credit - see IME 411.}.

IME 627. Packaging for Electronics. 3 Credits.

Processes and materials for packaging of electronic components and devices, including integrated circuit chips, chip packages, and board level packaged systems; boards and substrates technology; quality and reliability of electronic packages. Open to all engineering majors. Cross-listed with ECE 627. {Also offered for undergraduate credit - see IME 427.}.

IME 630. Process Engineering. 3 Credits.

Comprehensive analysis of selected manufacturing processes; development of process flow maps, schematic and mathematical modeling of process dynamics, and evaluation of processing alternatives. Design of effective and efficient processes for selected industrial products. Seminar/case study format. {Also offered for undergraduate credit - see IME 430.}.

IME 631. Production Engineering. 3 Credits.

Design of a production system for selected manufactured products, development of production system flow maps and linked process dynamic models, evaluation of throughput and identification of constraints. Evaluation of alternative solutions for production constraints. Undergraduate: design of fixtures, dies and tooling for economical production. Graduate: In-depth analysis of contemporary production systems for selected manufactured products; development of production systems issues. Seminar/case study format. Recommended: IME 630. {Also offered for undergraduate credit - see IME 431.}.

IME 633. Additive Manufacturing. 3 Credits.

A synchronized approach considering functional design, analysis and manufacturing that support seamless integration of geometry with performance. The course will address additive manufacturing principles; scope of additive manufacturing; bio-manufacturing. {Also offered for undergraduate credit - see IME 433.}.

IME 635. Plastics and Injection Molding Manufacturing. 3 Credits.

Product and process engineering for manufacturers of plastic products; material evaluation and selection, mold design, process design, quality evaluation of manufactured plastic parts. Cross-listed with ME 635. {Also offered for undergraduate credit - see IME 435.}.

IME 637. Methods for Precision Manufacturing. 3 Credits.

Fundamental principles and applications of methods of precision micro- and nano-scale manufacturing of discrete parts and assembled products made of metallic and non-metallic engineering materials. {Also offered for undergraduate credit - see IME 437.}.

IME 640. Engineering Economy. 3 Credits.

Capital investment decision foundation within rules of general and project accounting. Analysis of benefits and returns against cost for engineering installation, operation, life cycle and make-or-buy decisions. Dual-listing: 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.

Collection, analysis, evaluation, and presentation of engineering and scientific data, SPC, Sampling, Descriptive Statistics, Discrete and Continuous statistical distributions, Estimation Procedures, Hypothesis Testing, Linear Regression and ANOVA. Dual-listing: 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 684. Scheduling Methods. 3 Credits.

Concepts, methods, and results of scheduling theory. Modern sequencing and scheduling applications in industrial and manufacturing systems. Optimization methods, algorithms, and heuristic procedures to solve practical scheduling problems such as single machine, parallel machines, job families and batches, flow shop, and job shop. Dual-listing: IME 484.

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.

This course provides an in-depth exploration of neural networks, with a strong focus on deep learning. Students will learn fundamental concepts, including shallow and deep neural networks, optimization techniques, loss functions, and performance evaluation. The course covers key architectures such as Convolutional Neural Networks (CNNs), Transformers, Graph Neural Networks (GNNs), and Generative Adversarial Networks (GANs). Emphasis is placed on practical applications, with Python-based implementation, assignments, and a hands-on project aimed at solving real-world problems. Students will also engage in critical analysis of recent research in the field.

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 XX01. ID 100-level elective. 99.00 Credits.

ID XX02. ID 200-level elective. 99.00 Credits.

ID XX03. ID 300-level elective. 99.00 Credits.

ID XX04. ID 400-level elective. 99.00 Credits.

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 394. Individual Study. 1-5 Credits.

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.

ID 793. Individual Study/Tutorial. 1-5 Credits.

International Studies (INTL)

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 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 793. Individual Study. 1-5 Credits.**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. Prereq or Coreq: College of Business major, minor or certificate 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 380. People Analytics. 3 Credits.

This course takes a data-driven approach to managing human resources within organizations. Students will learn how to apply analytics to identify people-related challenges, collect relevant data, analyze and interpret the results, communicate findings effectively, and develop actionable insights to optimize workforce management within the organization. Prereq: MGMT 320. Prereq or Coreq: College of Business major, minor or certificate 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. Prereq or Coreq: College of Business major, minor or certificate and a 2.50 minimum NDSU grade point average. Dual-listing: 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 course 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. Prereq or Coreq: College of Business major, minor or certificate 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. Prereq or Coreq: College of Business major, minor or certificate and a 2.50 minimum NDSU grade point average.

MGMT 491. Seminar. 1-5 Credits.**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 MGMT 452.}.

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. Prereq or Coreq: College of Business major, minor or certificate and a 2.50 minimum NDSU grade point average.

MIS 371. Web Scripting Languages. 3 Credits.

This course examines Scripting Languages and their applications. Emphasis will be placed on web scripting. A representative set of scripting languages will be covered. Prereq: CSCI 122 or CSCI 160 or CSCI 227 or ECE 173. Cross-listed with CSCI 371. Restricted to College of Business 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. Data Visualization. 2 Credits.

This course provides advanced usage of data analytics, database, and development of digital dashboards through data visualization tools such as Power BI or Tableau. Emphasis is on the application of theoretical understanding of the human interaction with the user interface and the development of digital dashboards, such as charts, graphs, and animations, to facilitate communication and story-telling using data. Effectively communicating analysis results to a management and business audience using dashboards to enhance decision-making is examined. Prereq or coreq: Open to MSBA students or with permission of instructor.

MIS 740. Predictive Analytics. 2 Credits.

This course develops an understanding of practical applicability of predictive 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 business analytics techniques and machine learning, which include text mining, natural language processing, web analytics, social analytics, and simulation.

MIS 760. Business AI. 2 Credits.

Explores fundamental business AI concepts and the latest developments. Covers business AI technologies, their applications, and implications. Focuses on AI-driven digital transformation. Develops a holistic, strategic understanding of AI-integrated businesses, products, and services. Prereq or Coreq: Business Analytics Graduate Certificate, Master of Accountancy (MAcc), Master of Business Administration (MBA), MBA in Agribusiness, Master of Science in Business Analytics (MSBA), Pharmacy, or other programs with approval from the Accounting and Information Systems Graduate Program Director.

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. Credit awarded only for MRKT 301 or MRKT 320 (formerly BUSN 360), not both. Prereq or Coreq: College of Business major, minor or certificate and a 2.50 minimum NDSU grade point average.

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. Prereq or Coreq: College of Business major, minor or certificate and a 2.50 minimum NDSU grade point average. Dual-listing: 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 MRKT 430. Prereq or Coreq: College of Business major, minor or certificate and a 2.50 minimum NDSU grade point average. Dual-listing: 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: Restricted to College of Business major, minor or certificate, or BS in Data Science, and a 2.50 minimum NDSU grade point average.

MRKT 470. Services Marketing. 3 Credits.

This course focuses on management and strategic issues as they relate to the marketing of services. Prereq: MRKT 320. Prereq or Coreq: College of Business major, minor or certificate and a 2.50 minimum NDSU grade point average. Dual-listing: 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 or Coreq: Admission to MBA or MBA Agribusiness or MSBA 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 or Coreq: Admission to MBA or MBA Agribusiness or MSBA 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 or Coreq: Admission to MBA or MBA Agribusiness or MSBA 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 or Coreq: Admission to MBA or MBA Agribusiness or MSBA 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 or Coreq: Admission to MBA or MBA Agribusiness or MSBA 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 or Coreq: Admission to MBA or MBA Agribusiness or MSBA 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 or Coreq: Admission to MBA or MBA Agribusiness or MSBA program.

MBA 708. Advanced Strategic Management. 2 Credits.

This course teaches from the perspective of top management, integrating functional business expertise into analysis of the firm's internal resources and capabilities with analysis of the external environment in which the firm competes, to enable formulation and implementation of company strategy. Prereq: MBA 701, MBA 702, MBA 703, MBA 704, MBA 705, MBA 706.

MBA 711. Advanced Investment Analysis. 2 Credits.

This course provides students with a fundamental understanding of investments and the theory and practice of financial valuation. Students will learn how to value a publicly listed company after identifying key internal and external investment factors. Students will deliver a detailed research recommendation on a stock investment idea. Students will use Bloomberg terminals in the Commodity Trading Lab to gain hands-on experience through valuation analysis and have the opportunity to participate in the Student Managed Investment Fund (Bison Fund). This course will also be useful for students who are planning to take the CFA (Chartered Financial Analyst) exams. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 712. Advanced Portfolio Management. 2 Credits.

This course provides students with a fundamental understanding of investments and the theory and practice of modern portfolio management. Students will gain in-depth knowledge of portfolio construction and performance evaluation. Students will use Bloomberg terminals in the Commodity Trading Lab to gain hands-on experience through portfolio management and have the opportunity to participate in the Student Managed Investment Fund (Bison Fund). Students will deliver a written report and detailed presentation of their portfolio results. This course will also be useful for students who are planning to take the CFA (Chartered Financial Analyst) exams. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 713. Financial Derivatives. 2 Credits.

This course is designed to enable students to understand the nature and functions of financial derivatives, including the various futures and options contracts. It covers the role of derivatives markets, the characteristics of derivative products, pricing methodology, and trading strategy of derivatives.

MBA 714. Financial Analysis and Valuation. 2 Credits.

The goal of this course is to develop MBA students' ability to use financial information and related disclosures to evaluate the underlying economics of a firm. This course covers the theory and practice of financial analysis and valuation, and particularly focuses on the analysis, interpretation and prediction of firm financial performance, such as profitability and risks, operating and non-operating cash flows, and management of strategic financing and investing. Prereq: Admission to the MBA program.

MBA 721. Creating and Marketing Innovations. 2 Credits.

This course focuses on creating and enhancing customer value through new products and services. Students will learn the value of new product strategy and new product development process from opportunity identification to launch. Prereq or Coreq: Admission in the MBA or MBA Agribusiness or MSBA or graduate certificate in Digital Marketing and Innovation program.

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 or Coreq: Admission to MBA or MBA Agribusiness or MSBA or graduate certificate in Digital Marketing and Innovation or graduate certificate in Business Analytics.

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 or Coreq: Admission in the MBA or MBA Agribusiness or MSBA or graduate certificate in Digital Marketing and Innovation 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 or Coreq: Admission in the MBA or MBA Agribusiness or MSBA or graduate certificate in Digital Marketing and Innovation program.

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 or Coreq: Admission in MBA or MBA Agribusiness or MSBA or graduate certificate in Leadership and Managerial Skills.

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 or Coreq: Admission in MBA or MBA Agribusiness or MSBA or graduate certificate in Leadership and Managerial Skills.

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 or Coreq: Admission in MBA or MBA Agribusiness or MSBA or graduate certificate in Leadership and Managerial Skills.

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 or Coreq: Admission in MBA or MBA Agribusiness or MSBA or graduate certificate in Leadership and Managerial Skills.

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. Prereq or Coreq: Admission in MBA or MBA Agribusiness or MSBA or graduate certificate in Leadership and Managerial Skills.

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 or Coreq: Admission in MBA or MBA Agribusiness or MSBA or graduate certificate in Business Analytics.

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 or Coreq: Admission in MBA or MBA Agribusiness or MSBA or graduate certificate in Business Analytics.

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 or Coreq: Admission in MBA or MBA Agribusiness or MSBA or graduate certificate in Business Analytics.

MBA 790. Graduate Seminar. 1-3 Credits.**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. Credit awarded only for MATH 105 or MATH 107, not both. Prereq: MATH 98 with a grade of C or higher or placement.

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 103 (or placement) and MATH 105 (or placement), or MATH 107.

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 260. Vector Calculus. 1 Credit.

The course introduces vector fields, line integrals, parametric surfaces, and surface integrals. It covers the main theorems of vector calculus: Green's theorem, Stokes' theorem, and the Divergence theorem. Prereq: MATH 259.

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. (Math 259 and Math 260 together cover the same content as Math 265. Credit awarded for Math 259 and 260, or for Math 265, but not for both.) Prereq: MATH 166.

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 346 and Math 260 or Math 265. Dual-listing: 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 270 and Math 260 or Math 265. Dual-listing: MATH 652.

MATH 453. Introduction to Lebesgue Measure. 3 Credits.

Definition of Lebesgue measure. Measurable and Lebesgue integrable functions. Introduction to L_p spaces. Prereq: MATH 450. {Also offered for graduate credit - see MATH 653}.

MATH 454. Introduction to Functional Analysis. 3 Credits.

Functional analysis in sequence spaces. Standard sequence spaces and dual spaces. Hahn-Banach Theorem. Operators on sequence spaces. Prereq: MATH 346. {Also offered for graduate credit - See MATH 654}.

MATH 459. Topics in Analysis. 3 Credits.

Topics will vary and may include: Harmonic Analysis, Dynamical Systems, Fractals, Distribution Theory, and Approximation Theory. Prereq: MATH 450. {Also offered for graduate credit - See MATH 659.}.

MATH 460. Mathematical Software. 1 Credit.

An overview of a mathematical software system, with a focus on its utility in mathematical problems. Possible software systems may include: Mathematica, SAGE, or similar programs. May be repeated for credit with a different software. Prereq: MATH 259 or MATH 265. {Also offered for graduate credit - see MATH 660.}.

MATH 472. Number Theory. 3 Credits.

Properties of integers, number theoretic functions, quadratic residues, continued fractions, prime numbers and their distribution, primitive roots. Prereq: MATH 270. {Also offered for graduate credit - see MATH 672.}.

MATH 473. Cryptology. 3 Credits.

Cryptography and cryptanalysis of ciphers. Discrete logarithms, Diffie-Hellman key exchange, the RSA cryptosystem, elliptic curve cryptography, and selected topics. Prereq: MATH 270 and MATH 329. {Also offered for graduate credit - see MATH 673.}.

MATH 476. Actuary Exam Study. 1 Credit.

Selected material from probability and mathematical statistics in preparation for the national actuarial exam. Prereq: STAT 368 or STAT 468. Cross-listed with STAT.

MATH 478. History of Mathematics. 3 Credits.

Historical considerations emphasizing the source of mathematical ideas, growth of mathematical knowledge, and contributions of some outstanding mathematicians. Prereq: MATH 270. {Also offered for graduate credit - see MATH 678.}.

MATH 480. Applied Differential Equations. 3 Credits.

Method of power series and method of Frobenius, oscillation theorems, special functions (Bessel functions and Legendre functions), linear systems including the exponential matrix. Sturm-Liouville and phase plane analysis as time permits. Prereq: MATH 266. {Also offered for graduate credit - see MATH 680.}.

MATH 481. Fourier Analysis. 3 Credits.

Discrete and continuous Fourier transforms, Fourier series, convergence and inversion theorems, mean square approximation and completeness, Poisson summation, Fast-Fourier transform. Prereq: MATH 260 or MATH 265. Dual-listing: MATH 681.

MATH 483. Partial Differential Equations. 3 Credits.

First and second order partial differential equations, classification, examples, solution methods for the wave, diffusion, and Laplace equations, causality and energy, boundary value problems, separation of variables, Green's identities, Green's functions. Prereq: MATH 266 and either MATH 270 or MATH 329. {Also offered for graduate credit - see MATH 683.}.

MATH 484. Mathematical Methods of Biological Processes. 3 Credits.

This course provides an introduction to mathematical methods in biology. Prereq: MATH 266. {Also offered for graduate credit - see MATH 684.}.

MATH 485. Topics in Applied Mathematics. 3 Credits.

Topics will vary and may include: Models in Biology and Finance, Network Theory, Calculus of Variation, Stochastic Calculus, Integral Transforms, Control Theory, and Parameter Estimation. Prereq: MATH 483. {Also offered for graduate credit - See MATH 685.}.

MATH 488. Numerical Analysis. 3 Credits.

Numerical solution of nonlinear equations, interpolation, numerical integration and differentiation, numerical solution of initial value problems for ordinary differential equations. Prereq: MATH 266. {Also offered for graduate credit - see MATH 688.}.

MATH 491. Seminar. 1-5 Credits.**MATH 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MATH 493. Undergraduate Research. 1-5 Credits.**MATH 494. Individual Study. 1-5 Credits.****MATH 496. Field Experience. 1-15 Credits.****MATH 499. Special Topics. 1-5 Credits.****MATH 620. Abstract Algebra I. 3 Credits.**

Groups, permutations, quotient groups, homomorphisms, rings, ideals, integers. {Also offered for undergraduate credit - see MATH 420.}.

MATH 621. Abstract Algebra II. 3 Credits.

Division rings, integral domains, fields, field extensions, Galois Theory. Prereq: MATH 620. {Also offered for undergraduate credit - see MATH 421.}.

MATH 629. Topics in Linear Algebra. 3 Credits.

Advanced topics in linear algebra with a focus on understanding the theoretical foundation of the subject and its uses in advanced mathematics. Topics may vary. {Also offered for undergraduate credit - see MATH 429.}.

MATH 630. Graph Theory. 3 Credits.

Graphs and directed graphs, graph models, subgraphs, isomorphisms, paths, connectivity, trees, networks, cycles, circuits, planarity, Euler's formula, matchings, bipartite graphs, colorings, and selected advanced topics. {Also offered for undergraduate credit - see MATH 430.}.

MATH 636. Combinatorics. 3 Credits.

Recurrence relations, formal power series, generating functions, exponential generating functions, enumeration, binomial coefficients and identities, hypergeometric functions, Ramsey theory, Sterling and Eulerian numbers. {Also offered for undergraduate credit - see MATH 436.}.

MATH 639. Topics in Algebra and Discrete Mathematics. 3 Credits.

Advanced topics in algebra and discrete mathematics. Topics may vary but may include: algebraic geometry, factorization, partially ordered sets, and/or coding theory. {Also offered for undergraduate credit. See MATH 439.}.

MATH 640. Axiomatic Geometry. 3 Credits.

Hilbert's axioms for Euclidean geometry, projective geometry, history of parallel axiom, hyperbolic geometry, elliptic geometry. {Also offered for undergraduate credit - see MATH 440.}.

MATH 642. Introduction to Topology. 3 Credits.

Basic Point-Set Topology: Topological Spaces, Open/Closed Sets, Continuity, Connectedness, Compactness; Surfaces: Classification, Basic Invariants; Introduction to Homology; Applications: Brouwer's Fix-Point Theorem, Ham and Sandwich Theorem. {Also offered for undergraduate credit - see MATH 442.}.

MATH 643. Differential Geometry. 3 Credits.

Local and global geometry of plane curves, local geometry of hypersurfaces, global geometry of hypersurfaces, geometry of lengths and distances. Dual-listing: 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. Dual-listing: MATH 452.

MATH 653. Introduction to Lebesgue Measure. 3 Credits.

Definition of Lebesgue measure. Measurable and Lebesgue integrable functions. Introduction to L_p spaces. {Also offered for undergraduate credit - see MATH 453.}.

MATH 654. Introduction to Functional Analysis. 3 Credits.

Functional analysis in sequence spaces. Standard sequence spaces and dual spaces. Hahn-Banach Theorem. Operators on sequence spaces. {Also offered for undergraduate credit - See MATH 454.}.

MATH 659. Topics in Analysis. 3 Credits.

Topics will vary and may include: Harmonic Analysis, Dynamical Systems, Fractals, Distribution Theory, and Approximation Theory. {Also offered for undergraduate credit - See MATH 459.}.

MATH 660. Mathematical Software. 1 Credit.

An overview of a mathematical software system, with a focus on its utility in mathematical problems. Possible software systems may include: Mathematica, SAGE, or similar programs. May be repeated for credit with a different software. {Also offered for undergraduate credit - see MATH 460.}.

MATH 672. Number Theory. 3 Credits.

Properties of integers, number theoretic functions, quadratic residues, continued fractions, prime numbers and their distribution, primitive roots. {Also offered for undergraduate credit - see MATH 472.}.

MATH 673. Cryptology. 3 Credits.

Cryptography and cryptanalysis of ciphers. Discrete logarithms, Diffie-Hellman key exchange, the RSA cryptosystem, elliptic curve cryptography, and selected topics. {Also offered for undergraduate credit - see MATH 473.}.

MATH 678. History of Mathematics. 3 Credits.

Historical considerations emphasizing the source of mathematical ideas, growth of mathematical knowledge, and contributions of some outstanding mathematicians. {Also offered for undergraduate credit - see MATH 478.}.

MATH 680. Applied Differential Equations. 3 Credits.

Method of power series and method of Frobenius, oscillation theorems, special functions (Bessel functions and Legendre functions), linear systems including the exponential matrix. Sturm-Liouville and phase plane analysis as time permits. {Also offered for undergraduate credit - see MATH 480.}.

MATH 681. Fourier Analysis. 3 Credits.

Discrete and continuous Fourier transforms, Fourier series, convergence and inversion theorems, mean square approximation and completeness, Poisson summation, Fast-Fourier transform. Dual-listing: MATH 481.

MATH 683. Partial Differential Equations. 3 Credits.

First and second order partial differential equations, classification, examples, solution methods for the wave, diffusion, and Laplace equations, causality and energy, boundary value problems, separation of variables, Green's identities, Green's functions. {Also offered for undergraduate credit - see MATH 483.}.

MATH 684. Mathematical Methods of Biological Processes. 3 Credits.

This course provides an introduction to mathematical methods in biology. {Also offered for undergraduate credit - see MATH 484.}.

MATH 685. Topics in Applied Mathematics. 3 Credits.

Topics will vary and may include: Models in Biology and Finance, Network Theory, Calculus of Variation, Stochastic Calculus, Integral Transforms, Control Theory, and Parameter Estimation. {Also offered for undergraduate credit - See MATH 485.}.

MATH 688. Numerical Analysis. 3 Credits.

Numerical solution of nonlinear equations, interpolation, numerical integration and differentiation, numerical solution of initial value problems for ordinary differential equations. {Also offered for undergraduate credit - see MATH 488.}.

MATH 690. Graduate Seminar. 1-3 Credits.**MATH 696. Special Topics. 1-5 Credits.****MATH 720. Algebra I. 3 Credits.**

Graduate level survey of algebra: rings, modules, linear algebra and selected advanced topics. Prereq: MATH 621.

MATH 721. Algebra II. 3 Credits.

Graduate level survey of algebra: groups, fields, Galois theory, and selected advanced topics. Prereq: MATH 720.

MATH 726. Homological Algebra. 3 Credits.

An overview of the techniques of homological algebra. Topics covered will include categories and functors, exact sequences, (co)chain complexes, Mayer-Vietoris sequences, TOR and EXT. Applications to other fields will be stressed. Prereq: MATH 720.

MATH 732. Introduction to Bioinformatics. 3 Credits.

An introduction to the principles of bioinformatics including information relating to the determination of DNA sequencing. Prereq: STAT 661. Cross-listed with CSCI 732 and STAT 732.

MATH 736. Enumerative Combinatorics. 3 Credits.

Combinatorial enumeration, generating functions, inversion formulae, formal power series, and selected advanced topics. Prereq: MATH 636.

MATH 737. Algebraic Combinatorics. 3 Credits.

Posets, distributive lattices, tableaux dynamics, symmetric functions, representation theory, and selected advanced topics. Prereq: MATH 636.

MATH 746. Topology I. 3 Credits.

Topological spaces, convergence and continuity, separation axioms, compactness, connectedness, metrizability, fundamental group and homotopy theory. Advanced topics may include homology theory, differential topology, three-manifold theory and knot theory. Prereq: MATH 642.

MATH 747. Topology II. 3 Credits.

Topological spaces, convergence and continuity, separation axioms, compactness, connectedness, metrizability, fundamental group and homotopy theory. Advanced topics may include homology theory, differential topology, three-manifold theory and knot theory. Prereq: MATH 642.

MATH 750. Analysis. 3 Credits.

Lebesgue and general measure and integration theory, differentiation, product spaces, metric spaces, elements of classical Banach spaces, Hilbert spaces, and selected advanced topics. Prereq: MATH 650.

MATH 752. Complex Analysis. 3 Credits.

Analytic and harmonic functions, power series, conformal mapping, contour integration and the calculus of residues, analytic continuation, meromorphic and entire functions, and selected topics. Prereq: MATH 652.

MATH 754. Functional Analysis. 3 Credits.

Normed spaces, linear maps, Hahn-Banach Theorem and other fundamental theorems, conjugate spaces and weak topology, adjoint operators, Hilbert spaces, spectral theory, and selected topics. Prereq: MATH 750.

MATH 756. Harmonic Analysis. 3 Credits.

A survey of Harmonic analysis including: L_p spaces; Fourier Series; Fourier transform; Hilbert transform; and special selected topics. Prereq: MATH 750.

MATH 760. Ordinary Differential Equations I. 3 Credits.

Existence, uniqueness, and extensibility of solutions to initial value problems, linear systems, stability, oscillation, boundary value problems, and selected advanced topics. Prereq: MATH 650 or MATH 680.

MATH 782. Mathematical Methods in Physics I. 3 Credits.

Review of practical mathematical methods routinely used by physicists, including applications. Focus on differential equations, variational principles, and other selected topics. Cross-listed with PHYS 752.

MATH 783. Mathematical Methods in Physics II. 3 Credits.

Tensor analysis, matrices and group theory, special relativity, integral equations and transforms, and selected advanced topics. Prereq: MATH 629 and MATH 652. Cross-listed with PHYS 753.

MATH 784. Partial Differential Equations I. 3 Credits.

Classification in elliptic, parabolic, hyperbolic type; existence and uniqueness for second order equations; Green's functions, and integral representations; characteristics, nonlinear phenomena. Prereq: MATH 650 or MATH 683.

MATH 790. Graduate Seminar. 1-3 Credits.**MATH 791. Temporary/Trial Topics. 1-5 Credits.****MATH 793. Individual Study/Tutorial. 1-5 Credits.****MATH 794. Practicum/Internship. 1-8 Credits.****MATH 796. Special Topics. 1-5 Credits.****MATH 797. Master's Paper. 1-3 Credits.****MATH 798. Master's Thesis. 1-10 Credits.****MATH 810. Research in the Teaching of University Mathematics. 3 Credits.**

This course will cover fundamental topics in mathematics education research including: research design, fundamental research areas, and the interconnection between research and classroom practices.

MATH 824. Topics in Commutative Algebra. 3 Credits.

Topics vary each time the course is offered and may include: dimension theory, integral dependence, factorization, regular rings, Cohen-Macaulay rings, Gorenstein rings. May be repeated for credit with change in subtopic. Prereq: MATH 720.

MATH 825. Theory Of Rings. 3 Credits.

The ideal theory of commutative rings, structure of (non-commutative) rings, and selected advanced topics. Prereq: MATH 720.

MATH 830. Graph Theory. 3 Credits.

Graduate-level survey of graph theory: paths, connectivity, trees, cycles, planarity, genus, Eulerian graphs, Hamiltonian graphs, factorizations, tournaments, embedding, isomorphism, subgraphs, colorings, Ramsey theory, girth. Prereq: MATH 630.

MATH 839. Topics in Combinatorics and Discrete Mathematics. 3 Credits.

Selected topics in combinatorics and discrete mathematics. Topics vary each time the course is offered and may include: symmetric functions, Coxeter theory, geometric combinatorics of polytopes, computational combinatorics, statistical mechanics and combinatorics, or dynamical algebraic combinatorics.

MATH 849. Topics in Geometry & Topology. 3 Credits.

Advanced topics in Geometry and/or Topology. Topics vary but may include: differential geometry, K-theory, knot theory, or noncommutative geometry. May be repeated for credit with change in subtopic. Prereq: MATH 642, MATH 643.

MATH 856. Dynamical Systems. 3 Credits.

A study of basic notions of topological and symbolic dynamics. Introduction to measurable dynamics and ergodic theory. Ergodicity, mixing and entropy of dynamical systems. Prereq: MATH 750.

MATH 857. Topics in Functional Analysis. 3 Credits.

Maximal monotone operators and the Hille-Yosida theorem, Sobolev spaces in dimension one and applications, Sobolev spaces in higher dimensions, extension operators, Sobolev embedding theorems, Poincare inequality, duality. May be repeated for credit with change in subtopic. Prereq: MATH 750. Co-req: MATH 751.

MATH 861. Ordinary Differential Equations II. 3 Credits.

Existence, uniqueness, and extendibility of solutions to initial value problems, linear systems, stability, oscillation, boundary value problems, difference equations, and selected advanced topics. Prereq: MATH 760.

MATH 862. Integral Equations. 3 Credits.

Existence and uniqueness of solutions of Fredholm and Volterra integral equations, Fredholm Theory, singular integral equations, and selected advanced topics. Prereq: MATH 650.

MATH 864. Calculus Of Variations. 3 Credits.

Variational techniques of optimization of functionals, conditions of Euler, Weierstrass, Legendre, Jacobi, Erdmann, Pontryagin Maximal Principle, applications, and selected advanced topics. Prereq: MATH 650.

MATH 867. Topics in Applied Mathematics. 3 Credits.

Topics will vary and may include: Optimal Control, Robust Control, Stability Analysis, Mathematics of Networks, Models in Biology, Levy Processes, Asymptotic Expansions. May be repeated for credit with change in subtopic. Prereq: MATH 650 or MATH 680.

MATH 878. Modern Probability Theory. 3 Credits.

Probability theory presented from the measure theoretic perspective. Emphasis on various types of convergence and limit theorems. Discussion of random walks, conditional expectations, and martingales. Prereq: STAT 768 or MATH 750. Cross-listed with STAT 778.

MATH 880. Methods of Optimization. 3 Credits.

Elements of convex analysis, constrained and unconstrained multi-dimensional linear and nonlinear optimization theory and algorithms, convergence properties and computational complexity. Prereq: CSCI 653. Cross-listed with CSCI 880.

MATH 881. Mathematical Control Theory. 3 Credits.

Standard optimal control and optimal estimation problems; duality; optimization in Hardy space; robust control design. Prereq: MATH 650.

MATH 885. Partial Differential Equations II. 3 Credits.

Nonlinear partial differential equations, Non-variational techniques, Hamilton-Jacobi equations, Riemann invariants, Entropy/entropy-flux pairs, selected advanced topics. Prereq: MATH 784.

MATH 888. Numerical Analysis. 3 Credits.

Numerical solutions to partial differential and integral equations, error analysis, stability, acceleration of convergence, numerical approximation, and selected advanced topics. Prereq: MATH 688.

MATH 893. Individual Study/Tutorial. 1-5 Credits.**MATH 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 program.

ME 189. Skills for Academic Success. 1 Credit.

This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

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.

Scalar and vector approaches to trusses, frames and machines, internal forces, friction forces, center of gravity, centroid, and moment inertia. Prereq: MATH 165.

ME 222. Engineering Mechanics II. 3 Credits.

Dynamics of particles and rigid bodies, work energy, impulse-momentum, principles of conservation of energy and momentum. Prereq: ME 221, MATH 166.

ME 223. Mechanics of Materials. 3 Credits.

Introduction to stress, strain, and their relationships; torsion of circular shafts, bending stresses, deflection of beams, stress transformations. Prereq: ME 221.

ME 291. Seminar. 1-3 Credits.**ME 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ME 294. Individual Study. 1-5 Credits.**ME 299. Special Topics. 1-5 Credits.****ME 331L. Materials Science and Engineering Laboratory. 1 Credit.**

Laboratory giving hands-on experience utilizing materials testing and microscopy processes to evaluate the mechanical performance of mechanical engineering design materials (metals, ceramics, plastics) and processing effects. Prereq: CHEM 122, ME 223 and admission to the Mechanical Engineering major. Coreq: ME 331.

ME 331. Materials Science and Engineering. 3 Credits.

Characterization of microscopic structures and associated macroscopic properties and performance of mechanical engineering design materials (metals, ceramics, plastics) and processing effects. Prereq: CHEM 122, ME 223 and admission to the Mechanical Engineering major. Coreq: ME 331L.

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 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, dielectric, 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 460. Product Design and Development. 3 Credits.

This course provides an insight into the mechanical design process with the focus on developing a new product with thoughtful implementation of human-centered design (robust design, design for environment, human factors, etc.). Topics on project planning and scheduling and conceptual design process will be covered. In addition, this course provides students with an introduction into the business aspects of project management and product development. Prereq or Coreq: Admission to ME program for ME major students, or junior standing and Departmental permission for non-ME majors. Dual-listing: ME 660.

ME 461. Design Project I. 3 Credits.

Capstone student project in design, analysis, and experimental investigation in mechanical engineering. ME 461 and ME 462 must be taken in consecutive semesters. Prereq: ME 460. Coreq: ME 443, ME 454. Prereq or Coreq: Senior standing in ME.

ME 462. Design Project II. 3 Credits.

Capstone student project in design, analysis, and experimental investigation in mechanical engineering. ME 461 and ME 462 must be taken in consecutive semesters. Prereq: ME 461.

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. Aerospace Propulsion. 3 Credits.

Theory and principles of air-breathing and rocket engines used in flight systems. Thermodynamic cycle analysis. Analysis of gas turbine and rocket propulsion systems, characteristics, components, and applications. Prereq: ME 352. Dual-listing: 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 evaluation of manufactured plastic parts. Cross-listed with IME 635. {Also offered for undergraduate credit - see ME 435.}.

ME 636. Biopolymers and Biocomposites. 3 Credits.

Structure/properties/synthesis of biopolymers, biomaterials and engineered biocomposites derived from plant based materials. An interdisciplinary course designed for graduate students. Introduction to science and engineering of converting biorenewable resources into novel biobased materials and products. Introduction to principles and concepts critical to successful design of polymeric biomaterials, coatings, and biocomposites. Understanding environmental impacts through life cycle analysis (LCA). Restrictions: A junior standing student can register if accepted to an accelerated graduate program. Cross-listed with CHEM 636 and CPM 636. {Also offered for undergraduate credit - See ME 436.}.

ME 637. Engineering Ceramics. 3 Credits.

Study the crystal and defect structures to determine the electrical and mass transport behaviors in ceramic materials. Investigation on microstructure of ceramic materials and its effect on optical, magnetic, dielectric, and thermo-mechanical properties. {Also offered for undergraduate credit - see ME 437.}.

ME 642. Machine Design I. 3 Credits.

Application of engineering mechanics, material properties, and failure theories to the design of reliable machine components. {Also offered for undergraduate credit - see ME 442.}.

ME 643. Machine Design II. 3 Credits.

Application of methods, procedures, and standards used in the design and selection of mechanical components and elements, including springs, roller and journal bearings, gears, brakes, belts and flexible elements. {Also offered for undergraduate credit - see ME 443.}.

ME 654. Heat and Mass Transfer. 3 Credits.

Principles of heat transfer by conduction, convection, and radiation. Introduction to mass transfer principles. {Also offered for undergraduate credit - see ME 454.}.

ME 660. 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 aspect of project management and product development. Dual-listing: ME 460.

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. Aerospace Propulsion. 3 Credits.

Theory and principles of air-breathing and rocket engines used in flight systems. Thermodynamic cycle analysis. Analysis of gas turbine and rocket propulsion systems, characteristics, components, and applications. Dual-listing: ME 484.

ME 685. Heating, Ventilation and Air Conditioning. 3 Credits.

Application of the basic fundamentals of thermodynamics, heat transfer, and fluid flow to heating, ventilating, and air conditioning. {Also offered for undergraduate credit - see ME 485.}.

ME 686. Nanotechnology and Nanomaterials. 3 Credits.

This course covers principles of nanotechnology, nanomaterials and develops a framework for their understanding. The basic tools of nanotechnology: nanoscale characterization, physics and materials design will be discussed in the context of current technological advances. {Also offered for undergraduate credit - see ME 486.}.

ME 687. Internal Combustion Engines. 3 Credits.

Theory and practice of power and propulsion engines utilizing gas as a working substance. Study of gas turbines, spark, and compression ignition engines. {Also offered for undergraduate credit - see ME 487.}.

ME 688. Introduction to Aerodynamics. 3 Credits.

Introductory aerodynamics, aerodynamic characteristics of airfoils, and other components subjected to inviscid-incompressible flows; dynamics of compressible fluids; shock waves, one-dimensional flow, expansion waves in two-dimensional flow, and compressible flow over aerodynamic bodies. {Also offered for undergraduate credit - see ME 488.}.

ME 689. Vehicle Dynamics. 3 Credits.

Fundamental science and engineering underlying the design and operation of vehicles. Use of previous knowledge of statics, kinematics, dynamics, and machine design. {Also offered for undergraduate credit - see ME 489.}.

ME 690. Graduate Seminar. 1-3 Credits.**ME 696. Special Topics. 1-5 Credits.****ME 711. Advanced Engineering Analysis. 3 Credits.**

Mathematical analysis and numerical treatment of engineering problems, eigenvalue problems in lumped and distributed parameter systems, advanced mathematics applied to engineering design.

ME 712. Advanced Finite Element Analysis. 3 Credits.

Application of finite element methods to problems of plasticity, viscoplasticity, fracture, vibrations, fluids, material and geometric non-linearity, and heat transfer. Recommended: ME 677.

ME 717. Advanced Controls for Mechanical Systems. 3 Credits.

Analysis and design of multivariable control systems for robust stabilization and optimal performance of mechanical systems.

ME 720. Continuum Mechanics. 3 Credits.

Tensor analysis in affine and metric spaces, kinematics of motion, general principles of continuum mechanics and postulates on constitutive laws. Two 75-minute lectures. Cross-listed with CE 720.

ME 721. Advanced Dynamics. 3 Credits.

Newtonian dynamics; dynamics of particles; dynamics of rigid bodies; multi-body dynamics; variational principles; principle of virtual work; d'Alembert's principle; Hamilton's principle; Lagrange's equation of motion; kinematics of rigid bodies; solutions of nonholonomic equations of motion.

ME 722. Advanced Mechanics of Materials. 3 Credits.

Stress, deformation, failure analysis of deformable bodies and structures under static and dynamic loadings, fundamental concepts and definitions in stress, strain, energy methods, plasticity, fracture, fatigue, creep, contact, impact and stability of solid bodies and plate bending problems.

ME 725. Advanced Mechanics and Failure of Composites. 3 Credits.

Concepts in static, dynamics, impact, and thermal analysis of anisotropic elastic materials are covered. Different failure theories, laminated theories, and micromechanics formulations of composites are reviewed in detail.

ME 726. Fracture Mechanics. 3 Credits.

Linear elastic fracture mechanics, energy release rate, stress intensity factor, J-integral, elasto-plastic fracture, crack tip plasticity, crack propagation, fracture fatigue crack growth, fracture tests, fracture in polymers, ceramics and composite materials.

ME 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 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, maturation, and function of the formed elements of human blood. Identification of normal cells will be emphasized. Prereq: MICR 202L or MICR 350L.

MLS 491. Seminar. 1-5 Credits.**MLS 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MLS 494. Individual Study. 1-5 Credits.**MLS 496. Field Exp/Internship. 1-15 Credits.**

Restricted to Medical Laboratory Science 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 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 401. The Science Toolkit: Skills for Scientific Success. 3 Credits.**

This course builds on the concepts introduced in introductory science classes but broadens the scope to encompass essential skills for success in science-related fields. The course emphasizes critical thinking, scientific literacy, research skills, and professional communication. Students will engage in active learning, group collaboration, and case-based problem-solving to develop practical competencies essential for scientific inquiry and professional growth. Prereq or Coreq: Complete a minimum of 45 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 454. Biotechnology for Sustainability. 1 Credit.

Biotechnology for Sustainability explores how biotechnology addresses global challenges like climate change, food security, and environmental health. Students will learn about genetic engineering, synthetic biology, and bioremediation, applying these tools to design innovative, sustainable solutions for agriculture, industry, and waste management. Dual-listing: MICR 654.

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 456. Human Microbiome. 1 Credit.

This course explores the dynamic and complex world of the human microbiome, focusing on its role in health, disease, and emerging therapeutic interventions. Topics include the microbiome's influence on the immune system, gut-brain axis, metabolism, and its applications in personalized medicine. Students will analyze recent scientific literature and engage in discussions about the ethical and societal implications of microbiome research. Prereq: MICR 350. Dual-listing: MICR 656.

MICR 457. Microbiomes: Agriculture and Environmental Resilience. 1 Credit.

This course explores the critical role of microbiomes in enhancing agricultural sustainability. Students will examine the interactions between microbial communities, plants, and soil, focusing on how these relationships can improve crop yields, soil health, and ecosystem resilience. The course emphasizes scientific principles, practical applications, and innovative technologies involving microbiomes in sustainable farming practices. Prereq: MICR 350. Dual-listing: MICR 657.

MICR 458. Animal Health and Antimicrobial Resistance (AMR). 1 Credit.

Animal Health and Antimicrobial Resistance (AMR) is designed to teach the fundamental concepts of AMR, its impact on animal health, and its spread from food production animals to humans and the wider environment. The specific topics covered in this course include AMR and One Health, AMR and mechanisms through which pathogenic bacteria acquire AMR genes, antibiotics used in livestock production, Food-producing and pet animal-associated zoonotic pathogens, and tools to study and survey AMR in veterinary medicine, as well as antibiotic alternative approaches. In addition, the relationship between animal microbiome and AMR will also be introduced. Prereq: MICR 350. Dual-listing: MICR 658.

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 archaeobacterial cell structure. Further functional exploration will go into nutrient transport in bacteria, principles of energy-yielding carbohydrate metabolism, bacterial fermentation, respiration, and gene regulations of metabolic pathways. Topics such as biofilms, quorum sensing, and the microbiome will be used to apply physiological concepts. Prereq: MICR 350, MICR 350L. Co-req: BIOC 460. {Also offered for graduate credit - see MICR 680.}.

MICR 481. Microbial Genomics with Computational Laboratory. 3 Credits.

Microbial genome science with additional emphasis on microbial evolution and environmental science. Topics include: i) genomic diversity, ii) the consequences of horizontal gene transfer, iii) single cell and population genomics, and iv) environmental metagenomics. Recommended: STAT 330. Prereq: BIOL/PLSC 315. {Also offered for graduate credit - see MICR 681.}.

MICR 482. Microbial Genetics. 3 Credits.

Microbial genetics will explore gene identification, mutation, DNA repair, gene transfer, recombination, bacteriophage genetics, and gene regulation. Topics such as bacterial antibiotic resistance, genetic testing and manipulation for biotechnological applications will be used to apply genetic concepts. Prereq: MICR 350. Coreq: BIOC 460. {Also offered for graduate credit - see MICR 682.}.

MICR 485. Capstone Experience 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 601. The Science Toolkit: Skills for Scientific Success. 3 Credits.**

This course broadens the scope of understanding science to encompass essential skills for success in science-related fields. The course emphasizes critical thinking, scientific literacy, research skills, and professional communication. Students will engage in active learning, group collaboration, and case-based problem-solving to develop practical competencies essential for scientific inquiry and professional growth. Dual-listing: MICR 401.

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 654. Biotechnology for Sustainability. 1 Credit.

Biotech for Sustainability explores how biotechnology addresses global challenges like climate change, food security, and environmental health. Students will learn about genetic engineering, synthetic biology, and bioremediation, applying these tools to design innovative, sustainable solutions for agriculture, industry, and waste management. Dual-listing: MICR 454.

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 656. Human Microbiome. 1 Credit.

This course explores the dynamic and complex world of the human microbiome, focusing on its role in health, disease, and emerging therapeutic interventions. Topics include the microbiome's influence on the immune system, gut-brain axis, metabolism, and its applications in personalized medicine. Students will analyze recent scientific literature and engage in discussions about the ethical and societal implications of microbiome research. Prereq: MICR 350. Dual-listing: MICR 456.

MICR 657. Microbiomes: Agriculture and Environmental Resilience. 1 Credit.

This course explores the critical role of microbiomes in enhancing agricultural sustainability. Students will examine the interactions between microbial communities, plants, and soil, focusing on how these relationships can improve crop yields, soil health, and ecosystem resilience. The course emphasizes scientific principles, practical applications, and innovative technologies involving microbiomes in sustainable farming practices. Dual-listing: MICR 457.

MICR 658. Animal Health and Antimicrobial Resistance (AMR). 1 Credit.

Animal Health and Antimicrobial Resistance (AMR) is designed to teach the fundamental concepts of AMR, its impact on animal health, and its spread from food production animals to humans and the wider environment. The specific topics covered in this course include AMR and One Health, AMR and mechanisms through which pathogenic bacteria acquire AMR genes, antibiotics used in livestock production, Food-producing and pet animal-associated zoonotic pathogens, and tools to study and survey AMR in veterinary medicine, as well as antibiotic alternative approaches. In addition, the relationship between animal microbiome and AMR will also be introduced. Dual-listing: MICR 458.

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 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 782. Molecular Microbiological Techniques. 3 Credits.

Familiarize students with current molecular and immunologic strategies and techniques commonly used to study infectious disease processes.

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 491. Seminar. 1-5 Credits.**LANG 491H. Seminar. 1-3 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.

Training of the musician in a broad spectrum of musical styles, forms, and repertoire. May be repeated for credit. Prereq or Coreq: Placement in ensemble by audition.

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 349. Vocal Methods & Pedagogy I. 2 Credits.

Instruction in vocal pedagogy and methods for music majors.

MUSC 351. Instrumental Conducting & Literature. 2 Credits.

Baton techniques as applied to different types of instruments. Rehearsal procedures and techniques, with practical application in conducting, instrumental laboratory organization. Prereq: MUSC 231.

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 435. Topics in Music Theory. 3 Credits.

An in-depth study of one of the major music theory analytical practices to be chosen by the instructor and based on the needs of the students. Possible topics could include, but are not limited to, Counterpoint, Analytical Techniques, Contemporary Harmonic Techniques, or Form and Analysis. May be repeated for credit. Dual-listing: MUSC 635.

MUSC 436. Topics in Music History. 3 Credits.

An in-depth study of one of the major historical periods or genres to be chosen by the instructor and based on the needs of the students. Possible topics could include, but are not limited to, Medieval/Renaissance, Baroque, Classical, Romantic or Contemporary musical periods. Genres will include vocal, choral and instrumental works that are considered to be representative of major composers and styles of each period. May be repeated for credit. Dual-listing: MUSC 636.

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. 3 Credits.

Survey of the history of opera with emphasis on selected works. Prereq: MUSC 340 and MUSC 341 or consent of instructor. Dual-listing: 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 446. 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. Dual-listing: MUSC 646.

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.

Focusing on the secondary music education student, this course is intended to provide the knowledge and information necessary to perform successfully as a band director at the middle school, junior high, or senior high level. Prereq: MUSC 231.

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 635. Topics in Music Theory. 3 Credits.

An in-depth study of one of the major music theory analytical practices to be chosen by the instructor and based on the needs of the students. Possible topics could include, but are not limited to, Counterpoint, Analytical Techniques, Contemporary Harmonic Techniques, or Form and Analysis. May be repeated for credit. Dual-listing: MUSC 435.

MUSC 636. Topics in Music History. 3 Credits.

An in-depth study of one of the major historical periods or genres to be chosen by the instructor and based on the needs of the students. Possible topics could include, but are not limited to, Medieval/Renaissance, Baroque, Classical, Romantic or Contemporary musical periods. Genres will include vocal, choral and instrumental works that are considered to be representative of major composers and styles of each period. May be repeated for credit. Dual-listing: MUSC 436.

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. 3 Credits.

Survey of the history of opera with emphasis on selected works. Dual-listing: 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 646. 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. Dual-listing: MUSC 446.

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. 1-3 Credits.

This course is structured as a theory survey 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. Students may register for 1 to 3 credits based on the curricular requirements for their degree program.

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. 1-3 Credits.

This course is structured as a history survey course for graduate students in music with reading assignments, essays, and objective tests covering Western music history from the Middle Ages through current times.

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 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.****MUSC 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.

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 457. Applied Analysis Tools for Natural Resources and Agriculture. 2 Credits.

This course provides an introduction to using R for applied purposes in natural resources and agriculture, from importing and manipulating data to visualization. Dual-listing: NRM 657.

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 470. 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. Dual-listing: NRM 670.

NRM 471. Landscape Genetics Lab. 1 Credit.

This lab explores how Landscape Genetics theory and computational methods are applied to real-world research and management challenges. Students will gain hands-on experience analyzing genetic data in relation to landscapes, helping to address ecological and conservation questions. Coreq: NRM 470. Dual-listing: NRM 671.

NRM 491. Seminar. 1-5 Credits.**NRM 493. Undergraduate Research. 1-5 Credits.****NRM 494. Individual Study. 1-5 Credits.****NRM 496. Field Experience. 1-15 Credits.****NRM 499. Special Topics. 1-5 Credits.****NRM 601. Urban-Ecosystem Management. 3 Credits.**

An interdisciplinary management survey examining the urban/rural interface and environmental and social factors driving the process of urbanization as a sustainable ecosystem. {Also offered for undergraduate credit - see NRM 401.}.

NRM 602. River and Stream Resource Management. 3 Credits.

The structure and function of river and stream ecosystems: biotic and abiotic functioning, stream and river ecological theories, management and monitoring practices. {Also offered for undergraduate credit - see NRM 402.}.

NRM 620. Sustainable Scenarios in Natural Resources Management. 3 Credits.

An interdisciplinary course to investigate the key competencies needed for sustainable social-ecological systems and how sustainable scenarios can be built for the future management of natural resources. {Also offered for undergraduate credit - see NRM 420.}.

NRM 621. Environmental Outreach Methods. 3 Credits.

Introduction to philosophies, theories, and methods common to environmental education and outreach. {Also offered for undergraduate credit - see NRM 421.}.

NRM 631. National Environmental Policy Act & Environmental Impact Assessment. 3 Credits.

The interaction and effects of the National Environmental Policy Act (NEPA) with national environmental policy; implementation of the NEPA; public opinion on the state of the environment; introduction to EIS (Environmental Impact Statements). {Also offered for undergraduate credit - see NRM 431.}.

NRM 652. Managing Natural and Rangeland Resources using GIS. 3 Credits.

The application of Geographic Information Systems to managing natural and rangeland resources will be investigated. Different natural and rangeland resource datasets, analysis methods, and software packages will be utilized. Cross-listed with RNG 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 657. Applied Analysis Tools for Natural Resources and Agriculture. 2 Credits.

This course provides an introduction to using R for applied purposes in natural resources and agriculture, from importing and manipulating data to visualization. Dual-listing: NRM 457.

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. Dual-listing: NRM 470.

NRM 671. Landscape Genetics Lab. 1 Credit.

This lab explores how Landscape Genetics theory and computational methods are applied to real-world research and management challenges. Students will gain hands-on experience analyzing genetic data in relation to landscapes, helping to address ecological and conservation questions. Coreq: NRM 670. Dual-listing: NRM 471.

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 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.

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 280. Introduction to Global Health. 3 Credits.

This course offers an introduction to global health, examining the social, economic, environmental, and political factors shaping health worldwide. Students will explore disease burdens, health disparities, and the role of international organizations, emphasizing ethical and culturally sensitive approaches. Through case studies and discussion, students gain foundational knowledge to address global health challenges and promote sustainable solutions, making it ideal for those pursuing public health, international development, or healthcare careers.

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. 5 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 or coreq: 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, pathophysiology, 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. Maternal Newborn Nursing. 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. 4 Credits.

This course will explore the current health care environment with special emphasis on patient-centered care, ethics, professionalism and therapeutic communication. Prereq or Coreq: Admission to the RN to 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. Pediatric Nursing. 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. 4 Credits.

This course focuses on the nurse's role in providing safe, quality health care in health systems. Prereq or Coreq: Admission to the RN to BSN Program.

NURS 372. Expanded Family Nursing I. 2 Credits.

Builds upon prior learning and knowledge about obstetrical and neonatal nursing care with an increased emphasis on advanced concepts including labor & childbirth, complications of childbearing, and common female reproductive conditions. Prereq: NURS 360.

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 376. Challenges and Trends in Nursing. 3 Credits.

Students will have an opportunity to learn about the complex systems in which healthcare occurs, including the impact of policy, economics, and emerging issues. Prereq or Coreq: Admission to the RN to BSN program.

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 400. Comprehensive Adult Health I. 6 Credits.**

This course focuses on the etiology, pathophysiologic mechanisms, and nursing care of adult clients. May be repeated for credit. Prereq or Coreq: Admission into the BSN Accelerated nursing subplan.

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. Psychosocial 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 407L. Expanded Clinical Practice for the LPN-BSN. 3 Credits.

This course focuses on the etiology, pathophysiologic mechanisms, and mental health aspects of nursing care for patients in a variety of settings including medical/surgical, critical care, labor and delivery and simulation. Prereq: NURS 372 and NURS 407.

NURS 407. Adult Health: Complex Problems. 3 Credits.

Designed for persons with a nursing license, this course focuses on the etiology, pathophysiologic mechanisms, and organization of nursing care for adult clients experiencing selected complex stressors. Prereq: NURS 307 and NURS 360.

NURS 410. Research and Redesign. 2 Credits.

A study of the research process. Emphasis is placed on critically evaluating nursing research and utilizing research for evidence-based practice. Discussion about quality improvement principles prepares the nurse to participate in redesign. Prereq: NURS 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 II. 6 Credits.

Focuses on the etiology, pathophysiologic mechanisms, and nursing care of adult patients experiencing selected multiple high acuity conditions. 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 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 446. Population Health Nursing. 4 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 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 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 462. Nurses as Leaders. 4 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 to 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 or NURS 382.

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 710. Introduction to Acute Care Practice, Advanced Therapeutics & Diagnostics. 2 Credits.**

This clinical and laboratory course introduces students to the use of diagnostic and treatment modalities utilized in acute and critical care settings. The content includes principles such as fluid replacement, hemodynamic monitoring, and other interventions like mechanical ventilation. Students will learn to analyze laboratory data and interpret radiographs and ECGs. This course combines theoretical knowledge with practical skills, preparing students to handle real-life scenarios in acute care environments. Prereq or Coreq: Completion of MS or DNP FNP Program and certified as Family Nurse Practitioner (FNP).

NURS 711. Adult-Gerontology Acute Care Management I. 2 Credits.

This course focuses on the diagnosis and management of acutely ill adults across the lifespan experiencing cardiopulmonary chronic disorders in the acute care setting. Course will include theory, assessment, pharmacology and advanced therapeutics in high acuity patient settings through all phases of hospitalization and illness. Prereq or Coreq: Completion of MS or DNP FNP Program.

NURS 711P. Adult-Gerontology Acute Care Practicum I. 4 Credits.

This course provides the opportunity to apply knowledge and develop skills related to the role of the adult-gerontology acute care nurse practitioner in acute care settings, under the supervision of a health care provider who has documented expertise in the area of specialization. Coreq: NURS 711. Prereq or Coreq: Completion of MS or DNP FNP Program.

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.

This course delves into advanced healthcare provision, focusing on disaster preparedness and rural health. It covers strategies for emergency response, addresses rural health challenges, and emphasizes a systems-level and informatics perspective. Additionally, it prepares students to manage office emergencies in rural clinics and enhances skills for advanced practice nursing. Prereq or coreq: Admission to the NDSU DNP Nursing Program.

NURS 831. Advanced Pharmacology I. 2 Credits.

Information relative to therapeutic management guidelines for treatment of selected disease processes. Drug information by classification and basic principles of pharmacodynamic and pharmacokinetics, clinical uses, mechanisms of action, contraindications, adverse reactions, and client education implications.

NURS 832. Advanced Pharmacology II. 2 Credits.

Continuation of information relative to therapeutic management guidelines for treatment of selected disease processes. Drug information by classification and basic principles of pharmacodynamic and pharmacokinetics, clinical uses, mechanisms of action, contraindications, adverse reactions, and client education implications. Prereq: NURS 631.

NURS 833P. Family Primary Care:Residency I. 6 Credits.

Student synthesizes skills acquired in previous didactic and clinical courses to provide diagnosis, treatment, and management of an increasingly varied group of clients. Prereq: NURS 833.

NURS 833. Family Primary Care I:Assessment and Management. 3 Credits.

Clinical decision making skills are fostered in the diagnosis, management, monitoring and evaluation of common acute, emergent, and chronic health conditions. Selected case studies of clients will be examined in relation to problems, diagnoses, plans, and evaluations. Prereq: NURS 812P, NURS 816.

NURS 834. Family Primary Care II:Assessment and Management. 3 Credits.

Clinical decision making skills are fostered in the diagnosis, management, monitoring and evaluation of common acute, emergent, and chronic health conditions. Selected case studies of clients will be examined in relation to problems, diagnoses, plans, and evaluations. Prereq: NURS 833.

NURS 834P. Family Primary Care:Residency II. 6 Credits.

Students synthesize skills acquired in previous didactic and clinical courses, in particular NURS 833P, to provide diagnosis, treatment, and management of an increasingly varied group of clients. Prereq: NURS 833P.

NURS 835P. Practicum IV: FNP Role Integration. 6 Credits.

Application of skills and clinical experiences in primary care. Didactic concepts are incorporated in the student's practice, supervised by a health care provider who has documented expertise in the area of specialization. History, physical examinations, and diagnostic analysis will be integrated into evaluation of clients. Prereq: NURS 834P.

NURS 835. Family Primary Care III: Assessment and Management. 2 Credits.

Continuation of Family Primary Care I and II. Focus on health promotion, maintenance, restoration and disease prevention. Application of health-related theories, family dynamics, methods of human genetics, research protocols, ethics, cost effectiveness and legal ramifications for advanced nursing practice. Prereq: NURS 834.

NURS 836P. Practicum V: FNP Role Integration. 7 Credits.

Application of skills and clinical experiences in primary care. Didactic concepts are incorporated in the student's practice, supervised by a health care provider who has documented expertise in the area of specialization. History, physical examinations, and diagnostic analysis will be integrated into evaluation of clients. Prereq: NURS 835P.

NURS 850P. Family Primary Care: Specialty Practicum. 3 Credits.

Students are immersed into a specialty clinical area and supervised by a healthcare provider with expertise in the specialty. Theory, research, and didactic learning are incorporated in the student's clinical experience. Prereq: NURS 834P.

NURS 880. Interprofessional Collaborative Practice. 2 Credits.

Building on prior learning, graduate nursing students will synthesize and analyze interprofessional skills required to assume the role of provider on the healthcare team, such as communication, collaboration, leadership, conflict resolution, consultations, team building, and roles and responsibilities. Prereq: NURS 820.

NURS 890. Seminar. 1-5 Credits.**NURS 893. Individual Study/Tutorial. 1-5 Credits.****NURS 894. Practicum/Internship. 1-8 Credits.****NURS 899S. Clinical Dissertation. 1-15 Credits.**

The clinical dissertation is a scholarly work that focuses on practice issues. It involves identification, development, implementation, and evaluation and/or dissemination of an evidence-based project addressing a current clinical issue. Graded 'S' or 'U'.

Pharmaceutical Sciences (PSCI)

PSCI 194. Individual Study. 1-5 Credits.

PSCI 196. Field Experience. 1-15 Credits.

PSCI 199. Special Topics. 1-5 Credits.

PSCI 291. Seminar. 1-3 Credits.

PSCI 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PSCI 294. Individual Study. 1-5 Credits.

PSCI 299. Special Topics. 1-5 Credits.

PSCI 300. Pharmaceutical Organic Chemistry. 5 Credits.

This course provides pre-professional pharmacy students enrolled in the Doctor of Pharmacy Early Admissions Pathway with a comprehensive overview of organic chemistry and related topics relevant to the professional pharmacy curriculum such as structure-activity relationships, drug design, and common pharmaceutical polymers. Prereq: CHEM 121, CHEM 121L, CHEM 122, CHEM 122L. Restricted to students who have conditional acceptance in the NDSU Doctor of Pharmacy program.

PSCI 301. Biochemistry and Molecular Biology for Pharmacists. 5 Credits.

The primary goal in this course is to ensure that students begin to understand how biological processes occur at the molecular level. Students will also study the structure and function of the molecules of living cells, with an emphasis on proteins in the context of antibiotic and other drug interactions. The course will include an introduction to biomolecules, an examination of the generation and use of metabolic energy, biosynthesis, metabolic regulation, and an introduction of the storage, transmission, and expression of genetic information. Prereq: CHEM 342 or PSCI 300. Restricted to students who have conditional acceptance in the NDSU Doctor of Pharmacy program.

PSCI 367. Pharmaceutical Calculations. 1 Credit.

Qualitative and quantitative principles encompassing calculations performed by pharmacists in traditional and specialized practice settings. Scope includes computations related to prescriptions and medication orders. Restricted to students 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 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.

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. 4 Credits.

This course is designed to be an introduction to institution-based pharmacy practice. This course consists of a 4-week, 152-hour, unpaid, supervised pharmacy practice experience clinical rotation in an institutional pharmacy setting and required assignments. Pass/Fail grading. Prereq: PHRM 400, PHRM 450, PHRM 452L, PHRM 480, PHRM 532, PHRM 534, PHRM 535, PHRM 538, PSCI 413, PSCI 414, PSCI 415, PSCI 417 - all with a grade of "C" or better.

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, 152 hour, unpaid, supervised pharmacy practice experience in a community pharmacy setting and required assignments. Pass/Fail grading. Prereq: PHRM 301, PHRM 340, PHRM 341, PHRM 351L, PHRM 353, PHRM 360, PHRM 565, PSCI 367, PSCI 368, PSCI 369, PSCI 410, PSCI 411, PSCI 412, PSCI 470 and MICR 470 - all with a grade of "C" or better.

PHRM 468. Psychopharmacology for Health Professionals. 3 Credits.

This course will equip future workers in the helping professions to work with their clients and patients to support them with use of medications that treat mental disorders. Topics discussed include: major types of medications used to treat mental health disorders, patient medication experiences, helping patients to self-monitor mental disorders, tips for patient education, dealing with stigma, complex psychotropic medication pearls, and promoting medication adherence. Dual-listing: PHRM 668.

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 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.

Pharmacotherapy of cardiovascular and pulmonary diseases. Study of the pathophysiology, clinical presentation, and treatment of various cardiovascular and pulmonary diseases. Prereq: PSCI 413 and PSCI 414 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 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 668. Psychopharmacology for Health professionals. 3 Credits.

This course will equip future workers in the helping professions to work with their clients and patients to support them with use of medications that treat mental disorders. Topics discussed include: major types of medications used to treat mental health disorders, patient medication experiences, helping patients to self-monitor mental disorders, tips for patient education, dealing with stigma, complex psychotropic medication pearls, and promoting medication adherence. Dual-listing: PHRM 468.

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 170. Artificial Intelligence and Society. 3 Credits.

Technology has not only been a tool for human beings and society to make their lives run more efficiently and effectively, it has changed how we think about the natures of humanity and society, as well as what we have for our morality. This class explores the historical and philosophical transformations caused by technology to place AI's impact of society in contextual perspective.

PHIL 171. Ethics and AI. 3 Credits.

AI will be a significant component in our lives, if it has not already become so. This course introduces students to AI's ethical issues and provides them with a practical moral decision procedure to address current and future moral problems stemming from AI.

PHIL 194. Individual Study. 1-5 Credits.**PHIL 196. Field Experience. 1-15 Credits.****PHIL 199. Special Topics. 1-5 Credits.****PHIL 210. Ethics. 3 Credits.**

Overview of different types of approaches to ethical dilemmas such as theistic ethics, naturalistic ethics, and situational ethics. Covers the ethical issues confronted in personal, public, and professional life.

PHIL 215. Contemporary Moral Issues. 3 Credits.

Many contemporary moral issues, such as the developed world's duties to the developing world, war, ethical technology, and gender issues are examined in light of the major ethical theories, such as Utilitarianism, Kantianism, and Relativism.

PHIL 216. Business Ethics. 3 Credits.

Many of the central moral issues of business, such as consumer rights, advertising, employee rights, and business competition, are examined in light of the major ethical theories, such as Utilitarianism, Kantianism, and Relativism.

PHIL 221. Indian Philosophical Tradition. 3 Credits.

An introduction to the philosophical tradition of the Indian Subcontinent. The course focuses on the major orthodox (astika) schools of Vedic philosophy, Samkhya, Nyaya, Vaisheshika, Mimamsa, Vedanta, and Yoga, while also discussing the heterodox (nastika) Buddhist, Jain, and Materialist (Carvaka) schools. The course will present the major figures, teachings, and arguments of these schools with a special focus on their metaphysical and ethical views.

PHIL 225. Environmental Ethics. 3 Credits.

An investigation of ethics and the environment, including but not limited to ecofeminism, economics as environmental policy, and deep ecology.

PHIL 257. Traditional Logic. 3 Credits.

Study of the art and science of critical thinking; scientific method emphasized.

PHIL 291. Seminar. 1-5 Credits.**PHIL 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHIL 294. Individual Study. 1-5 Credits.**PHIL 299. Special Topics. 1-5 Credits.****PHIL 321. Ancient Philosophy. 3 Credits.**

Greco-Roman philosophy from pre-Socratics to the Stoics and Epicureans.

PHIL 322. Medieval Philosophy. 3 Credits.

Western philosophy from St. Augustine to Ockham and Marsilius of Padua.

PHIL 323. Modern Philosophy. 3 Credits.

Western philosophy from Descartes to Kant.

PHIL 324. Contemporary Philosophy. 3 Credits.

An overview of the main philosophical thinkers and positions in the contemporary period.

PHIL 327. Ethics, Engineering, and Technology. 3 Credits.

Students will learn a unique and systematic approach to deal with the ethical issues that are increasingly inherent in technology and engineering practice. Using human morality, this course will examine the emergence of advanced technological systems and how they affect our individual and social behaviors, and in return, how they are affected by those behaviors and our shared and individual morality. Students will examine a broad range of ethical topics in design, sustainability and emerging technologies, professional codes of ethics and case studies. Cross-listed with ENGR 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 491H. Seminar. 3 Credits.**PHIL 491. Seminar. 1-5 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, nebulae, 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, nebulae, galaxies.

PHYS 120L. Fundamentals of Physics Laboratory. 1 Credit.

Application of physics concepts and principles to the real world. Topics selected from mechanics, heat, optics, electricity, and magnetism.

PHYS 120. Fundamentals of Physics. 3 Credits.

Application of physics concepts and principles to the real world. Topics selected from mechanics, heat, optics, electricity, and magnetism.

PHYS 171. Introductory Projects in Physics. 1 Credit.

Basic computer controlled instrumentation for automation and data acquisition. Design of simple measurement and control projects covering waveforms, temperature measurement and robotics. Elementary data analysis: curve fitting, Fourier theory and statistics.

PHYS 194. Individual Study. 1-5 Credits.**PHYS 196. Field Experience. 1-15 Credits.****PHYS 199. Special Topics. 1-5 Credits.****PHYS 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 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 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 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 215. Research For Undergraduates. 1-3 Credits.

Special research studies in physics under the supervision of an instructor.

PHYS 251R. University Physics I Recitation. 1 Credit.

A recitation that complements PHYS 251 with theory and applications. Coreq: PHYS 251.

PHYS 251L. University Physics I Laboratory. 1 Credit.

Newtonian mechanics of translational and rotational motion, work, energy, power, momentum, conservation of energy and momentum, periodic motion, waves, sound, heat, and thermodynamics. Prereq: MATH 165.

PHYS 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. Coreq: MATH 165.

PHYS 252R. University Physics II Recitation. 1 Credit.

A recitation that complements PHYS 252 with emphasis on theory and applications. Coreq: PHYS 252.

PHYS 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 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 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 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 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 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 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, Schrodinger equation, uncertainty, duality, Born interpretation, unstable states, bosons and fermions, central force problems, angular momentum, spin. Prereq: PHYS 350, MATH 266. {Also offered for graduate credit - see PHYS 685.}.

PHYS 486. Quantum Mechanics II. 3 Credits.

Continuation of PHYS 485. Perturbation theory, angular momentum addition, variational schemes, WKB method, scattering theory, time dependent problems. Prereq: PHYS 485. {Also offered for graduate credit - see PHYS 686.}.

PHYS 488. Senior Project I. 1 Credit.

This is the first course of the capstone experience in physics. It results in the proposal of an undergraduate research project that is carried out in the second capstone course. Pass/Fail only. Department consent required.

PHYS 489. Senior Project II. 2 Credits.

This is the second course of the capstone experience in physics. The student carries out the research project proposed in the first capstone course. Prereq: PHYS 488.

PHYS 491. Seminar. 1-5 Credits.**PHYS 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHYS 494. Individual Study. 1-5 Credits.**PHYS 496. Field Experience. 1-15 Credits.****PHYS 499. Special Topics. 1-5 Credits.****PHYS 611. Optics for Scientists & Engineers. 3 Credits.**

Introduction to modern optics. Geometric optics, electromagnetic nature of light, polarization, interference, diffraction, fiber optics. Corequisite laboratory with major related optics project. Coreq: PHYS 611L. Cross-listed with ECE 611. {Also offered for undergraduate credit - see PHYS 411.}.

PHYS 611L. Optics for Scientists and Engineers Lab. 1 Credit.

Required laboratory for PHYS 611 or ECE 611. Ten optics experiments plus a major related optics project. Coreq: PHYS 611. Cross-listed with ECE 611L. {Also offered for undergraduate credit - see PHYS 411L.}.

PHYS 613. Lasers for Scientists and Engineers. 3 Credits.

Lecture and laboratory introduction to lasers. Spontaneous and stimulated transitions, line-broadening, gain, gain saturation, optical resonators, Fabry-Perot interferometers, theory of laser oscillation, rate equations, transverse modes, coherence, and Gaussian beams. Cross-listed with ECE 613. {Also offered for undergraduate credit - see PHYS 413.}.

PHYS 615. Elements of Photonics. 3 Credits.

Analysis of optical systems using the matrix formulation, wave propagation in anisotropic media, electro-optic effect and laser modulation, physical origin of optical non-linearities, phase matching, optical second harmonic and parametric generation. Cross-listed with ECE 615. {Also offered for undergraduate credit - see PHYS 415.}.

PHYS 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, Schrodinger equation, uncertainty, duality, Born interpretation, unstable states, bosons and fermions, central force problems, angular momentum, spin. {Also offered for undergraduate credit - see PHYS 485.}.

PHYS 686. Quantum Mechanics II. 3 Credits.

Continuation of PHYS 685. Perturbation theory, angular momentum addition, variational schemes, WKB method, scattering theory, time dependent problems. Prereq: PHYS 685. {Also offered for undergraduate credit - see PHYS 486.}.

PHYS 690. Graduate Seminar. 1-5 Credits.**PHYS 696. Special Topics. 1-5 Credits.****PHYS 752. Mathematical Methods in Physics I. 3 Credits.**

Review of practical mathematical methods routinely used by physicists, including applications. Focus on differential equations, variational principles, and other selected topics. Cross-listed with MATH 782.

PHYS 758. Statistical Physics. 3 Credits.

Review of thermodynamics and statistical mechanics; Monte Carlo and molecular dynamics simulation; applications to phase transitions.

PHYS 761. Electromagnetism. 3 Credits.

Review of Maxwell's equations, radiation, collisions between charged particles, dynamics of relativistic particles and fields.

PHYS 771. Quantum Physics I. 3 Credits.

Schrodinger equation, wave packets, uncertainty, angular momentum, spin, second quantization, harmonic oscillator, resistance mechanisms.

PHYS 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 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.

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 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 424. Fundamental Plant Pathology. 2 Credits.**

This course provides a broad-based understanding of the basic principles of plant pathology. Topics include history of the science and the causes, effects, diagnosis, and management of economic plant diseases. The emphasis is on plant diseases of field and horticultural plant species that are economically important to the region, potentially impactful for modern consumers, or are pertinent to the history of the science. Coreq: PPTH 424L. Dual-listing: PPTH 624.

PPTH 424L. Fundamental Plant Pathology Laboratory. 1 Credit.

Etiology, symptomatology and control of representative plant diseases and demonstrations. Gain hands-on experience through plant pathology laboratory techniques. Coreq: PPTH 424. Dual-listing: PPTH 624L.

PPTH 435. Principles of Plant Disease Management. 1 Credit.

This course focuses on the principles and practices of plant disease management, specifically addressing diseases that affect field and forage crops. It explores various strategies, such as the use of fungicides, host resistance, cultural practices, and biological control, to effectively manage plant diseases. Coreq: PPTH 435 and PPTH 436 and PPTH 437. Dual-listing: PPTH 635.

PPTH 436. Fungicide: Basics, Resistance, and Emerging Trends. 1 Credit.

This course will provide a comprehensive overview of fungicides and nematocides, including their mode of action, resistance development, pesticide regulations, and factors influencing their performance in the field. Topics covered will include timing, formulation, label reading, application rate, mobility, adjuvants, spray and nozzle equipment, pesticide drift, and precision agriculture solutions. Dual-listing: PPTH 636.

PPTH 437. Practices of Plant Disease Management Research. 1 Credit.

This course is a comprehensive guide to designing and implementing trials for evaluating plant disease management strategies. It covers principles of experimental design, trial setup, data collection using multiple tools (visual observation to the use of precision agriculture), and analysis methods. The course emphasizes practical skills and real-world applications. Dual-listing: PPTH 637.

PPTH 442. Practical Nematology. 1 Credit.

This course focuses on important plant-parasitic nematodes on crops. The covered topics include current nematode occurrence status, general knowledge of nematode morphology, basic biology and epidemiology, nematode vector of virus, nematode and virus detection and their association, field sampling, early detection, identification and enumeration, molecular diagnostics of nematode species, nematode data interpretation, real-world problems and scenarios, and management strategies. Critical discussion on the nematode problems and scenarios and practical application of the knowledge will be conducted. Dual-listing: PPTH 642.

PPTH 443. Greenhouse Inoculation and Phenotyping of Crop Diseases. 1 Credit.

This course will provide students with hands-on experience in inoculating and phenotyping major crop diseases under controlled greenhouse conditions. The course will cover basic principles and methods on inoculation and evaluation of fungal, bacterial and viral diseases in major crops, including wheat, barley, bean and pulse crops, canola, soybean, potato, sugar beet, and sunflower. Dual-listing: PPTH 643.

PPTH 445. New Science and Technology in Crop Protection. 1 Credit.

This course provides information and knowledge on current and emerging scientific discoveries and technologies posed to revolutionize crop protection. The basic science underlying techniques such as CRISPR-Cas9 and its derived techniques, broad-spectrum and durable disease resistance strategies, genetic engineering and minichromosome technology, artificial intelligence & precision agriculture, microbiomes, biocontrols, and biofertilizers, phytonanotechnology, RNAi and Bioclay, synthetic biology and novel pesticides, as well as modeling, genomic, and phenomic selection will be explained. The benefits, limitations and regulations of those technologies to be applied in crop protection will be discussed. The course is targeted at traditional students as well as industry stakeholders who seek continuing education. Prereq: PPTH 424. Dual-listing: PPTH 645.

PPTH 447. Fundamentals of Molecular Techniques in Agriculture. 1 Credit.

This course provides an overview of essential molecular and immunological techniques used in agricultural research and diagnostics, including Polymerase Chain Reaction (PCR), Reverse Transcription PCR (RT-PCR), digital droplet PCR (ddPCR), and Enzyme-Linked Immunosorbent Assay (ELISA). It also introduces students to laboratory safety, orientation, and best practices in molecular research, emphasizing the skills necessary for modern agricultural applications. Through lectures, instructional videos, and case studies, participants will build a strong foundation in both laboratory operations and molecular techniques critical for diagnostics and research. Dual-listing: PPTH 647.

PPTH 448. Plant Disease Diagnostics and Quantification. 1 Credit.

Class lectures describe the classical and modern techniques that are used to diagnose and quantify plant diseases in farmer fields as well as under controlled environments. The main techniques include disease symptom and sign-based diagnostics, enzyme-linked immunosorbent assay (ELISA), microscopic examinations, nucleic acid (DNA/RNA) based detection and next-generation sequencing. Students are required to submit a term paper at the end of the course. The course involves critical discussion on the application of techniques, methodology, data collection, and analysis. Prereq: PPTH 447. Dual-listing: PPTH 648.

PPTH 457. Landscape Plant Pathology. 2 Credits.

Diseases of landscape plants, including forest trees, turfgrass, and nursery/greenhouse plants, with a focus on identification, biology, and management. Prereq: PPTH 424. Dual-listing: 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 462. Identification and Management of Non-Soybean Oil and Legume Crop Diseases. 1 Credit.

This course has been designed to increase knowledge in disease identification, disease development, and use of appropriate management tools for diseases in canola, dry edible bean, flax, pulse crops (chickpea, lentil, field pea) and sunflower. Emphasis is placed on highest-acreage crops and highest-impact diseases in the United States. Dual-listing: PPTH 662.

PPTH 463. Identification and Management of Soybean and Corn Diseases. 1 Credit.

This course has been designed to increase knowledge in disease identification, disease development, and use of appropriate management tools for diseases in soybean and corn. Emphasis will be placed on diseases most common and/or economically important in the United States. Dual-listing: PPTH 663.

PPTH 464. Identification and Management of Small Grain Diseases. 1 Credit.

This course has been designed to increase knowledge in disease identification, disease development, and use of appropriate management tools for diseases in wheat, barely, oat and rye. Dual-listing: PPTH 664.

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 624. Fundamental Plant Pathology. 2 Credits.**

This course provides a broad-based understanding of the basic principles of plant pathology. Topics include history of the science and the causes, effects, diagnosis, and management of economic plant diseases. The emphasis is on plant diseases of field and horticultural plant species that are economically important to the region, potentially impactful for modern consumers, or are pertinent to the history of the science. Coreq: PPTH 624L. Dual-listing: PPTH 424.

PPTH 624L. Fundamental Plant Pathology Laboratory. 1 Credit.

Etiology, symptomatology and control of representative plant diseases and demonstrations. Gain hands-on experience through plant pathology laboratory techniques. Coreq: PPTH 624L. Dual-listing: PPTH 424L.

PPTH 635. Principles of Plant Disease Management. 1 Credit.

This course focuses on the principles and practices of plant disease management, specifically addressing diseases that affect field and forage crops. It explores various strategies, such as the use of fungicides, host resistance, cultural practices, and biological control, to effectively manage plant diseases. Coreq: PPTH 635 and PPTH 636 and PPTH 637. Dual-listing: PPTH 435.

PPTH 636. Fungicide: Basics, Resistance, and Emerging Trends. 1 Credit.

This course will provide a comprehensive overview of fungicides and nematicides, including their mode of action, resistance development, pesticide regulations, and factors influencing their performance in the field. Topics covered will include timing, formulation, label reading, application rate, mobility, adjuvants, spray and nozzle equipment, pesticide drift, and precision agriculture solutions. Dual-listing: PPTH 436.

PPTH 637. Practices of Plant Disease Management Research. 1 Credit.

This course is a comprehensive guide to designing and implementing trials for evaluating plant disease management strategies. It covers principles of experimental design, trial setup, data collection using multiple tools (visual observation to the use of precision agriculture), and analysis methods. The course emphasizes practical skills and real-world applications. Dual-listing: PPTH 437.

PPTH 642. Practical Nematology. 1 Credit.

This course focuses on important plant-parasitic nematodes on crops. The covered topics include current nematode occurrence status, general knowledge of nematode morphology, basic biology and epidemiology, nematode vector of virus, nematode and virus detection and their association, field sampling, early detection, identification and enumeration, molecular diagnostics of nematode species, nematode data interpretation, real-world problems and scenarios, and management strategies. Critical discussion on the nematode problems and scenarios and practical application of the knowledge will be conducted. Dual-listing: PPTH 442.

PPTH 643. Greenhouse Inoculation and Phenotyping of Crop Diseases. 1 Credit.

This course will provide students with hands-on experience in inoculating and phenotyping major crop diseases under controlled greenhouse conditions. The course will cover basic principles and methods on inoculation and evaluation of fungal, bacterial and viral diseases in major crops, including wheat, barley, bean and pulse crops, canola, soybean, potato, sugar beet, and sunflower. Dual-listing: PPTH 443.

PPTH 645. New Science and Technology in Crop Protection. 1 Credit.

This course provides information and knowledge on current and emerging scientific discoveries and technologies poised to revolutionize crop protection. The basic science underlying techniques such as CRISPR-Cas9 and its derived techniques, broad-spectrum and durable disease resistance strategies, genetic engineering and minichromosome technology, artificial intelligence & precision agriculture, microbiomes, biocontrols, and biofertilizers, phytonanotechnology, RNAi and Bioclay, synthetic biology and novel pesticides, as well as modeling, genomic, and phenomic selection will be explained. The benefits, limitations and regulations of those technologies to be applied in crop protection will be discussed. The course is targeted at traditional students as well as industry stakeholders who seek continuing education. Dual-listing: PPTH 445.

PPTH 647. Fundamentals of Molecular Techniques in Agriculture. 1 Credit.

This course provides an overview of essential molecular and immunological techniques used in agricultural research and diagnostics, including Polymerase Chain Reaction (PCR), Reverse Transcription PCR (RT-PCR), digital droplet PCR (ddPCR), and Enzyme-Linked Immunosorbent Assay (ELISA). It also introduces students to laboratory safety, orientation, and best practices in molecular research, emphasizing the skills necessary for modern agricultural applications. Through lectures, instructional videos, and case studies, participants will build a strong foundation in both laboratory operations and molecular techniques critical for diagnostics and research. Dual-listing: PPTH 447.

PPTH 648. Plant Disease Diagnostics and Quantification. 1 Credit.

Class lectures describe the classical and modern techniques that are used to diagnose and quantify plant diseases in farmer fields as well as under controlled environments. The main techniques include disease symptom and sign-based diagnostics, enzyme-linked immunosorbent assay (ELISA), microscopic examinations, nucleic acid (DNA/RNA) based detection and next-generation sequencing. Students are required to submit a term paper at the end of the course. The course involves critical discussion on the application of techniques, methodology, data collection, and analysis. Dual-listing: PPTH 448.

PPTH 657. Landscape Plant Pathology. 2 Credits.

Diseases of landscape plants, including forest trees, turfgrass, and nursery/greenhouse plants, with a focus on identification, biology, and management. Prereq: PPTH 624. Dual-listing: 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 662. Identification and Management of Non-Soybean Oil and Legume Crop Diseases. 1 Credit.

This course has been designed to increase knowledge in disease identification, disease development, and use of appropriate management tools for diseases in canola, dry edible bean, flax, pulse crops (chickpea, lentil, field pea) and sunflower. Emphasis is placed on highest-acreage crops and highest-impact diseases in the United States. Dual-listing: PPTH 462.

PPTH 663. Identification and Management of Soybean and Corn Diseases. 1 Credit.

This course has been designed to increase knowledge in disease identification, disease development, and use of appropriate management tools for diseases in soybean and corn. Emphasis will be place on diseases most common and/or economically important in the United States. Dual-listing: PPTH 463.

PPTH 664. Identification and Management of Small Grain Diseases. 1 Credit.

This course has been designed to increase knowledge in disease identification, disease development, and use of appropriate management tools for diseases in wheat, barely, oat and rye. Dual-listing: PPTH 464.

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 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. F.

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 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. 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 423. Principles of Weed Science. 3 Credits.

Introduction to weed control methods and practices, weed identification review, characteristics and categorization of herbicides, and pesticide application and dissipation. 2 lectures, 1 laboratory. Dual-listing: PLSC 623.

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. 2-3 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 623. Principles of Weed Science. 3 Credits.

Introduction to weed control methods and practices, weed identification review, characteristics and categorization of herbicides, and pesticide application and dissipation. 2 lectures, 1 laboratory. Dual-listing: PLSC 423.

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 712. Oilseeds Production (Canola, Sunflower, and Flax). 1 Credit.

History of sunflower, canola, and flax; growth and development; cultivars; soil fertility; seeding rate and date; row spacing; weed, insect, and disease management; harvesting; storage; and processing of oilseeds.

PLSC 713. Soybean and Corn Production. 1 Credit.

History of soybean and corn; growth and development; cultivars; soil fertility; seeding rate and date; row spacing; weed, insect, and disease management; harvesting; storage; and processing.

PLSC 714. Small Grains Production. 1 Credit.

History of spring wheat, durum, oats and barley; growth and development; cultivars; soil fertility; seeding rate and date; row spacing; weed, insect, and disease management; harvesting; storage; and processing of small grains.

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 893. Individual Study/Tutorial. 1-5 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 475. Policy Lab. 3 Credits.

A service-learning course in which students design, improve and evaluate social programs in response to the needs of local partner organizations. May be repeated for credit. Prereq or Coreq: Be a junior or senior; 3.00 GPA; or permission of instructor. Dual-listing: POLS 675.

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 675. Policy Lab. 3 Credits.

A service-learning course in which students design, improve and evaluate social programs in response to the needs of local partner organizations. May be repeated for credit. Prereq or Coreq: Permission of instructor. Dual-listing: POLS 475.

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 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 291. Seminar. 1-5 Credits.**

Seminar.

PAG 394. Individual Study. 1-5 Credits.**PAG 493. Undergraduate Research. 1-5 Credits.****PAG 494. Individual Study. 1-5 Credits.****PAG 496. Field Experience/Practicum. 1-15 Credits.****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 Suicide and its Impact. 3 Credits.

Overview of current understanding of the dynamics of suicide and its impact upon people left behind following the death.

PSYC 382. Self-Injury: Recognition & Treatment. 3 Credits.

Overview of the current understanding of the dynamics of self injurious behavior, of the prevalence of various types of harmful behavior, and of the populations most at risk.

PSYC 385. Psychology on Film. 3 Credits.

Many important issues and topics in psychology have been portrayed in feature films and documentaries. Movies and associated readings present significant concepts, persons, and historical events in psychology. Primary focus is on clinical psychology. Prereq: PSYC 111.

PSYC 391. Seminar. 1-5 Credits.**PSYC 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PSYC 394. Individual Study. 1-5 Credits.**PSYC 397. Coop/Internship. 1-5 Credits.****PSYC 399. Special Topics. 1-5 Credits.****PSYC 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 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. Broad topics discussed include: Principles of evidence-based public health and tools for implementation including health communication and informatics, applications of social and behavioral sciences, and health policy, law and ethics; Methods for addressing non-communicable diseases, communicable disease, and environmental diseases and injury; Examination of public health institutions and systems at the local, state, federal, and global levels as well as future issues in public health.

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 432. Cultural Competence for Health Professionals. 3 Credits.

This course will present evidence that cultural competence is a lifelong quest toward achieving positive outcomes for health service providers. It will also focus on specific cultures and various levels of sub-cultures within any given community and the impact or influence of those culturally driven behaviors and traditions upon community populations. Students will be exposed to methods to assist health professionals in ensuring that health decisions take into account individual understanding of the professional's knowledge and how this knowledge should be respectful of individual cultural preferences. The course is grounded in the understanding that cultural competency should not be viewed as an endpoint, but rather a lifelong pursuit of individuals, communities, organizations, and governments to strive for continuous improvement, by practicing cultural humility to effectively utilize assets and address the health needs of individual communities. Prereq or Coreq: Junior or senior standing. Dual-listing: PH 632.

PH 461. 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. Prereq or Coreq: Junior or senior standing. Dual-listing: PH 661.

PH 462. Global Health. 3 Credits.

Global Health will survey the health of populations globally and introduce strategies, programs and health systems designed to improve the health of those populations. Prereq: PH 474. Dual-listing: PH 662.

PH 465. 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. Prereq or Coreq: Junior or senior standing. Dual-listing: PH 665.

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, 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 632. Cultural Competence for Health Professionals. 3 Credits.**

This course will present evidence that cultural competence is a lifelong quest toward achieving positive outcomes for health service providers. It will also focus on specific cultures and various levels of sub-cultures within any given community and the impact or influence of those culturally driven behaviors and traditions upon community populations. Students will be exposed to methods to assist health professionals in ensuring that health decisions take into account individual understanding of the professional's knowledge and how this knowledge should be respectful of individual cultural preferences. The course is grounded in the understanding that cultural competency should not be viewed as an endpoint, but rather a lifelong pursuit of individuals, communities, organizations, and governments to strive for continuous improvement, by practicing cultural humility to effectively utilize assets and address the health needs of individual communities. Dual-listing: PH 432.

PH 661. 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. Dual-listing: PH 461.

PH 662. Global Health. 3 Credits.

Global Health will survey the health of populations globally and introduce strategies, programs and health systems designed to improve the health of those populations. Dual-listing: PH 462.

PH 665. 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. Prereq or coreq: Graduate student or instructor permission. Dual-listing: PH 465.

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.

This course provides exposure to key public health issues that need to be addressed in health policy development and the management of public health systems in the United States. The course will combine didactic learning, active learning, and student-centered instruction. Key areas of focus include systems-thinking, public health policy, advocacy, management, data, and evaluation. Prereq or Coreq: Admission to the MPH program or Public Health Graduate Certificate or instructor consent.

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. Prereq or Coreq: Admission to the MPH program or Public Health Graduate Certificate or instructor consent.

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. Prereq or Coreq: Admission to the MPH program or Public Health Graduate Certificate or instructor consent.

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. Prereq or Coreq: Admission to the MPH program or Public Health Graduate Certificate or instructor consent.

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 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. Fire Ecology and Rangeland Management. 3 Credits.

Provide historical and contemporary evidence of fire as an ecological process that has shaped the biophysical, ecological, and socio-ecological systems humans experience. Emphasis on fire and conservation of rangeland systems and understanding fire application for management objectives. Prereq: RNG 136. Dual-listing: 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 455. Ecology and Management of Woody Plant Encroachment in Rangelands. 2 Credits.

Examination of woody plant encroachment as a global phenomenon in rangeland systems. Specific focus will be on the social-ecological drivers of woody encroachment, impacts on rangeland ecosystem services, and management approaches from the past to present. Prereq: RNG 136 or NRM 225 or instructor approval. Dual-listing: RNG 655.

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 and Rangeland Management. 3 Credits.

Examination of the ecological principles that underpin interactions between herbivores and their environment and how to apply this knowledge to livestock grazing management in rangeland systems. Specific focus will be on how to achieve production and conservation outcomes. Prereq: RNG 136. Dual-listing: RNG 658.

RNG 462. Natural Resource and Rangeland Planning. 3 Credits.

Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Prereq: at least senior standing and must be a Natural Resources Management, Range Science or Soil Science major. Cross-listed with NRM and SOIL. {Also offered for graduate credit - see RNG 662.}.

RNG 491. Seminar. 1-5 Credits.**RNG 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

RNG 494. Individual Study. 1-5 Credits.**RNG 496. Field Experience. 1-15 Credits.****RNG 650. Range Plants. 3 Credits.**

Identification, distribution, and forage value of important U.S. range plants. 1 lecture, 2 two-hour laboratories. {Also offered for undergraduate credit - see RNG 450.}.

RNG 651. Fire Ecology and Rangeland Management. 3 Credits.

Provide historical and contemporary evidence of fire as an ecological process that has shaped the biophysical, ecological, and socio-ecological systems humans experience. Emphasis on fire and conservation of rangeland systems and understanding fire application for management objectives. Dual-listing: 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 655. Ecology and Management of Woody Plant Encroachment in Rangelands. 2 Credits.

Examination of woody plant encroachment as a global phenomenon in rangeland systems. Specific focus will be on the social-ecological drivers of woody encroachment, impacts on rangeland ecosystem services, and management approaches from the past to present. Dual-listing: RNG 455.

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 and Rangeland Management. 3 Credits.

Examination of the ecological principles that underpin interactions between herbivores and their environment and how to apply this knowledge to livestock grazing management in rangeland systems. Specific focus will be on how to achieve production and conservation outcomes. Dual-listing: 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 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 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 775. Rangeland Ecology and Management Certificate Capstone. 1 Credit.

This capstone course provides a culminating experience for students completing the certificate in Rangeland Ecology and Management. Students will reflect on their academic and professional growth, align their learning with industry and professional standards, and create a portfolio showcasing their best work from the program. The course emphasizes synthesis, self-assessment, and professional communication to prepare students for the next steps in their careers.

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 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.

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 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 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 494. Individual Study. 1-5 Credits.

Respiratory Care majors only.

RC 496. Field Experience. 1-15 Credits.

Respiratory Care majors only.

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 892. Graduate Teaching Experience. 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 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 422. Soil Fertility and Fertilizers. 3 Credits.

This course provides a broad-based understanding of the basic principles of soil fertility. Coverage includes occurrence, cycling, and plant availability of the essential mineral nutrients in soils; fertilizer sources, soil reactions, and efficiency; evaluating fertilizer/lime needs; methods of application; and the economics of fertilization. Prereq: SOIL 210, CHEM 121, CHEM 121L. Dual-listing: SOIL 622.

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 451. Digging Deeper: Understanding Soil Biology. 2-3 Credits.

This course will review the theory and application of laboratory procedures used to measure soil health indicators and biological and chemical characteristics across agricultural, rangeland, and grassland soils. Students will gain fundamental laboratory skills, as well as learn how to evaluate and interpret soil analyses. This course consists of two one-hour and 45 min laboratory periods. Prereq: SOIL 210.

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 622. Soil Fertility and Fertilizers. 3 Credits.

This course provides a broad-based understanding of the basic principles of soil fertility. Coverage includes occurrence, cycling, and plant availability of the essential mineral nutrients in soils; fertilizer sources, soil reactions, and efficiency; evaluating fertilizer/lime needs; methods of application; and the economics of fertilization. Dual-listing: SOIL 422.

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 651. Digging Deeper: Understanding Soil Biology. 2-3 Credits.

This course will review the theory and application of laboratory procedures used to measure soil health indicators and biological and chemical characteristics across agricultural, rangeland, and grassland soils. Students will gain fundamental laboratory skills, as well as learn how to evaluate and interpret soil analyses. This course consists of two one-hour and 45 min laboratory periods. Dual-listing: SOIL 451.

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 722. Soil Testing Basics. 1 Credit.

This course provides an overview of the basic principles governing soil testing as it relates to crop production. Coverage includes a review of basic soil chemistry principles, the evolution of soil testing, test correlation versus calibration, as well as the cycling, testing, and management of various nutrients. At the end of the course, students will have the opportunity to apply previous material in practical scenarios.

SOIL 723. Soil Carbon. 1 Credit.

This course will review the explore the current knowns and unknowns of soil carbon, focusing on whether soils can be a sink of carbon in agricultural (e.g., cropping and range) systems. The first half of the semester will focus on the different types of carbon in soil, the origin of these different carbon fractions, and how they are measured. The second half of the semester will focus on how these types of carbon are (or are not) affected by management in cropland and rangeland systems, as well as whether management can be used to increase carbon sequestration in agricultural settings.

SOIL 724. Soil Salinity and Sodicity. 1 Credit.

This course provides an introduction to the causes, impacts, and management of soil salinity and sodicity. Students will learn to assess salinity and sodicity using key parameters like EC, SAR, and ESP and explore strategies for remediation, including leaching and soil amendments. Ideal for graduate students in soil and environmental sciences, this course equips participants with essential tools for managing saline and sodic soils effectively.

SOIL 725. Soil Reclamation. 1 Credit.

This course examines soil reclamation techniques and strategies to restore ecosystems impacted by energy extraction activities, with an emphasis on sustainable and practical solutions.

SOIL 726. Soil Conservation for Practitioners. 1 Credit.

This course will provide an overview of soil conservation in the United States, introduce students to groups involved in soil conservation research and outreach, and discuss practices used to improve soil conservation by reducing erosion. Students will evaluate common cultural and engineering practices used to control soil erosion based on attainability and economically feasibility.

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 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 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 103. Beginner Spanish for Healthcare. 3 Credits.

This course is designed for students in the College of Health and Human Sciences who want to learn basic Spanish as related to their fields of study and daily activities. Beginner Spanish for Healthcare is an introductory course in Spanish for those students who have no background in the study of Spanish. The course is designed to give the student a basic knowledge of the Spanish language in the medical field. Overall, the course will focus on medical vocabulary, grammar structures and Hispanic cultures. Students will review grammatical structures needed to interact with patients such as asking questions and giving commands.

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)

SPMT 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.

SPMT 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: SPMT 190 with a grade of B or higher. Prereq or Coreq: Sport management major.

SPMT 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: SPMT 190.

SPMT 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.

SPMT 304. Sport Marketing and Public Relations. 3 Credits.

This course explores the aspects of the sports marketing industry and how industry interfaces with the consumer. Theories of sport promotion and public relations will be related to promotion efficacy. Prereq: SPMT 190.

SPMT 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. Prereq: SPMT 190. Prereq or Coreq: Restricted to Sport Management majors.

SPMT 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: SPMT 601.

SPMT 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. Prereq or Coreq: Sport Management majors only. Dual-listing: SPMT 614.

SPMT 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: SPMT 615.

SPMT 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: SPMT 616.

SPMT 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: SPMT 617.

SPMT 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: SPMT 618.

SPMT 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: SPMT 619.

SPMT 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: SPMT 621.

SPMT 425. Current Topics in Sport Management. 3 Credits.

This course introduces students to research topics unique to sport management. This course will examine research topics in sport management relating to marketing, consumer behavior, human resource development, diversity, media communication, sport for development, sport ecology, among other topics. Students will be introduced to multiple ways of understanding research topics in sport and learning how to apply learned concepts and findings efficiently within the industry. Prereq: SPMT 190, SPMT 226, and SPMT 304. Prereq or Coreq: Sport Management majors only. Dual-listing: SPMT 625.

SPMT 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: SPMT 190. Prereq or Coreq: Junior standing and Sport Management majors only. Dual-listing: SPMT 626.

SPMT 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: SPMT 190. Prereq or Coreq: Sport Management majors only or with instructor permission.

SPMT 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: SPMT 190. Prereq or Coreq: Sport Management majors only or with instructor permission.

SPMT 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: SPMT 190 and ECON 105. Prereq or Coreq: Sport Management majors only or with instructor permission. Dual-listing: SPMT 644.

SPMT 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. Repeats may not exceed 12 credits. Prereq: SPMT 190. Prereq or Coreq: Sport Management majors with junior or senior standing and with instructor permission. May be repeated for credit.

SPMT 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: SPMT 401.

SPMT 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: SPMT 414.

SPMT 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: SPMT 415.

SPMT 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: SPMT 416.

SPMT 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: SPMT 417.

SPMT 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: SPMT 418.

SPMT 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: SPMT 419.

SPMT 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: SPMT 421.

SPMT 625. Current Topics in Sport Management. 3 Credits.

This course introduces students to research topics unique to sport management. This course will examine research topics in sport management relating to marketing, consumer behavior, human resource development, diversity, media communication, sport for development, sport ecology, among other topics. Students will be introduced to multiple ways of understanding research topics in sport and learning how to apply learned concepts and findings efficiently within the industry. Prereq or Coreq: Enrollment in the Master's of Sport Management program or instructor permission. Dual-listing: SPMT 425.

SPMT 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: SPMT 426.

SPMT 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: SPMT 444.

SPMT 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.

SPMT 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.

SPMT 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.

SPMT 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.

SPMT 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.

SPMT 767. Strategic Sport Marketing. 3 Credits.

This course provides a strategic framework for understanding market dynamics, trends, consumer behavior, products, delivery systems, and marketing and promotional strategies that shape and drive the sports marketing industry. Prereq or Coreq: Must be accepted into the MS in Sport Management (MSM).

SPMT 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.

SPMT 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.

SPMT 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.

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 or STAT 368.

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 and STAT 368. Dual-listing: STAT 661.

STAT 462. Introduction to Experimental Design. 3 Credits.

Fundamental principles of designing an experiment, randomized block, Latin square, and factorial. Also covers analysis of covariance and response surface methodology. The class is designated as an undergraduate capstone course. Prereq: STAT 331 or STAT 461 and senior standing. {Also offered for graduate credit - see STAT 662.}.

STAT 463. Nonparametric Statistics. 3 Credits.

Various tests and confidence intervals that may be used when the underlying probability distributions are unknown. Includes the Wilcoxon, Kruskal-Wallis, and Friedman. Prereq: STAT 330 or STAT 368 {Also offered for graduate credit - see STAT 663.}.

STAT 464. Discrete Data Analysis. 3 Credits.

Application of binomial, hypergeometric, Poisson, mixed Poisson, and multinomial distributions in discrete data analysis. Log-linear models and contingency tables. Logistic regression. Discrete discriminant analysis. Prereq: STAT 367. {Also offered for graduate credit - see STAT 664.}.

STAT 465. Meta-Analysis Methods. 3 Credits.

Statistical methods for meta-analysis with applications. Various parametric effect size from a series of experiments: fixed effect, random effect linear models; combining estimates of correlation coefficients; meta-analysis in the physical and biological sciences. Prereq: STAT 331, STAT 461, or STAT 725. {Also offered for graduate credit - see STAT 665.}.

STAT 467. Probability and Mathematical Statistics I. 3 Credits.

Random variables, discrete probability distributions, density functions, joint and marginal density functions, transformations, limiting distributions, central limit theorem. Prereq: MATH 265 or STAT 368.

STAT 468. Probability and Mathematical Statistics II. 3 Credits.

Properties of estimators, confidence intervals, hypotheses testing, Neyman-Pearson lemma, likelihood ratio tests, complete and sufficient statistics. Prereq: STAT 467.

STAT 469. Introduction to Biostatistics. 3 Credits.

Introduction to biostatistical concepts and reasoning. Inference on means and proportion; Hypothesis testing; Group comparisons; Nonparametric methods; Sample size estimation; Contingency table; Simple and multiple regression; Logistic regression. Prereq: STAT 330. {Also offered for graduate credit - see STAT 669.}.

STAT 470. Statistical SAS Programming. 3 Credits.

Focuses on statistical problem solving and writing SAS computer code. Data types, data management, data input/output, SAS as a programming language, data analysis, report writing, and graphing. Prereq: STAT 461 or STAT 462. {Also offered for graduate credit - see STAT 670.}.

STAT 471. Introduction to the R Language. 3 Credits.

R commands, expressions, functions, and matrix operations. Elements of programming and graphics in R. Statistical problem solving with R: linear regression, experimental design. Knowledge of matrix algebra and inferential statistics is expected. Prereq: STAT 330 or STAT 368; MATH 128 or MATH 129. {Also offered for graduate credit - see STAT 671.}.

STAT 472. Time Series. 3 Credits.

Estimation of trend in time series data; seasonal models; stationary models; moving average, autoregressive, and ARMA models; model identification; forecasting; and intervention analysis. Prereq: STAT 468, STAT 461, course in matrix algebra. {Also offered for graduate credit - see STAT 672.}.

STAT 473. Actuarial Statistical Risk Analysis. 3 Credits.

Individual and collective actuarial risk models for claim random variables with applications in risk and survival analysis. Basics of interest theory and utility theory are also covered. The course is intended to prepare students for taking SOA/CAS Exam-2. Prereq: STAT 367 or STAT 467. {Also offered for graduate credit - see STAT 673.}.

STAT 476. Actuary Exam Study. 1 Credit.

Selected material from probability and mathematical statistics in preparation for the national actuarial exam. Prereq: STAT 368 or STAT 468. Cross-listed with MATH.

STAT 477. Introductory Survival and Risk Analysis I. 3 Credits.

Survival distributions, life tables, and various risk models, intended to prepare students for taking higher level actuarial exams: SOA1 Course FM/CAS2 Exam 2 and SOA Course MLC/CAS Exam 3L. Prereq: STAT 367 or STAT 467. {Also offered for graduate credit - see STAT 677.}.

STAT 478. Introductory Survival & Risk Analysis II. 3 Credits.

Distribution of the random variable- the time until future of a joint-life status, life tables, competing risks and multiple decrement probabilities, Markov chain and Poisson models, intended to prepare students for taking the actuarial exams: SOA1 Course MLC/CAS2 Exam 3L. Prereq: STAT 477 or STAT 677. {Also offered for graduate credit - see STAT 678.}.

STAT 491. Seminar. 1-5 Credits.**STAT 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

STAT 494. Individual Study. 1-5 Credits.**STAT 496. Field Experience. 1-15 Credits.****STAT 499. Special Topics. 1-5 Credits.****STAT 650. Stochastic Processes. 3 Credits.**

Discrete time Markov chains, Poisson processes, continuous time Markov chains, birth and death processes, renewal processes, branching processes, queueing 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, intended to prepare students for taking the actuarial exams: SOA1 Course MLC/CAS2 Exam 3L. Prereq: STAT 677. {Also offered for undergraduate credit - see STAT 478.}.

STAT 690. Graduate Seminar. 1-3 Credits.**STAT 696. Special Topics. 1-5 Credits.****STAT 711. Basic Computational Statistics using R. 3 Credits.**

Basic Statistics, General R, Data Manipulation, Basic Statistical Programming Skills, Simple Linear Regression, Classical Testing, and Categorical Data Analysis. 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 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.

STAT 899. Doctoral Dissertation. 1-15 Credits.

Supply Chain Management (SCM)

SCM 320. Integrated Supply Chain Management. 3 Credits.

This introductory course provides an overview of supply chain management (SCM) principles, processes, and strategies. It explores end-to-end supply chain processes, emphasizing the integration of procurement, production, distribution, and logistics. Students will analyze how information, materials, and finances flow across supply chain networks. Key topics include inventory management, demand forecasting, supplier relationships, material management, transportation, global supply chains, customer service, and the role of technology and sustainability in supply chain optimization. Prereq or Coreq: College of Business major, minor or certificate 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 397. Fe/Coop Ed/Internship. 1-4 Credits.**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 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 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 461. 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. Prereq or Coreq: Restricted to College of Business major or minor and a 2.50 minimum NDSU grade point average. Cross-listed with FIN 461. Dual-listing: SCM 661 FIN 661.

SCM 463. Business Location Analytics. 3 Credits.

In the presence of big data, AI, and the digital, global economy, businesses must navigate complex decisions about where to source, operate, and market to grow their customer base and create value for their businesses. Business Location Analytics explores how location intelligence informs these decisions by integrating spatial data into business development, marketing, and operations. Using tools like ArcGIS Business Analyst and real-world case study examples, students will learn to design, deploy, and manage location analytics solutions from both strategic and operational perspectives. This course will provide students with the knowledge and skills to harness location analytics as a critical factor for achieving business success and resilience in a competitive landscape. Prereq or Coreq: A cumulative GPA of at least 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 661. 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. Cross-listed with FIN 661. Dual-listing: SCM 461.

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 in Theatre NDSU's production season by working hands-on in the scene shop to create scenery and properties. Prereq or Co-req: THEA 270.

THEA 221. Costume Craft Lab. 1 Credit.

Participation in Theatre NDSU's production season by working hands-on in the costume shop. Co-req: THEA 271.

THEA 223. Costume Design Lab. 1 Credit.

Further study and practice of costume design by participating in the preparation of costumes for the Theatre NDSU production season. Co-req: THEA 277.

THEA 224. Lighting and Sound Design Lab. 1 Credit.

Further study and practice of Lighting and Sound Design by participating in the preparation of lighting and sound for the Theatre NDSU production season. Co-req: THEA 276.

THEA 228. Development of Musical Theatre. 3 Credits.

Introduction to Musical Theatre. Lectures provide historical survey. Weekly labs are devoted to active exploration of representative musical theatre repertoire. Cross-listed with MUSC 228.

THEA 230. Introduction to Theatrical Rendering. 3 Credits.

This course will teach students the basics of drawing and rendering for theatrical design practices utilizing various mixed media.

THEA 250. Theatre Foundations II. 1 Credit.

Seminar course for second year Theatre majors. Covers various topics related to auditions/interviews and pursuing careers in theatre. Meets once a week.

THEA 260. Theatre for Young Audiences Ensemble. 3 Credits.

The Theatre for Young Audiences Ensemble will use improvisation, storytelling, and creative drama techniques to create an original play for young audiences. Class will culminate with the ensemble presenting their play in local schools. Prereq: THEA 160.

THEA 262. Introduction to Dance. 1 Credit.

Practicum course expanding the beginning student performer's physical/kinesthetic awareness. Examines basic styles of dance as employed in theatrical presentation (ballet, modern dance, jazz, and/or tap). Basics in theatre dance audition techniques, and choreography.

THEA 263. Dance Studio. 1 Credit.

Introduction to the basic concepts and principles of Lyrical ballet, jazz or tap dance through studio experiences. Each semester will focus on one specific style. May be repeated for credit with change in topic.

THEA 266. Voice and Movement for the Actor. 3 Credits.

An introduction to the theory and practice of ideal vocal production and physical self-use. Exercises are offered addressing breath control, alignment, relaxation, resonance, articulation, projection, and expansion of physical and vocal creative expression. Prereq: THEA 161.

THEA 267. Acting for the Camera. 3 Credits.

An introductory examination and exploration of the technique of acting for the camera. This class is a practical studio course where students take their acting skills and adapt them for the use of camera acting. Prereq: THEA 161.

THEA 268. Acting the Song I. 3 Credits.

Study and application of the integration of acting and singing techniques. Restricted to Theatre and Music majors only. Prereq: MUSC 167 (1 semester). Co-req: THEA 161.

THEA 270. Stagecraft. 3 Credits.

An introduction to the crafts and technologies used in the production of scenery, lighting and sound in the theatre. Three 1-hour lectures, one 2-hour laboratory.

THEA 271. Costume Craft. 3 Credits.

Introduction to the techniques used for constructing costumes for theatre. 3 lectures, 1 two-hour laboratory.

THEA 272. Drawing for the Theatre. 3 Credits.

Introduction to drawing for the theatre to include hand and computer-assisted drafting techniques.

THEA 274. Introduction To Stage Design. 3 Credits.

Translation of text and music into ideas for stage design (scenery, costumes, lights) and introduction to use of both traditional and modern technologies in the process.

THEA 275. Theatrical Makeup Design. 3 Credits.

Fundamentals of stage makeup.; facial analysis and introduction to materials and techniques. Character interpretation through two and three-dimensional application.

THEA 279. Scenic Painting. 3 Credits.

This course covers basic scenic painting techniques and common practices.

THEA 280. World Theatre. 3 Credits.

Survey of the theatre and drama of various European and non-Western cultures.

THEA 291. Seminar. 1-5 Credits.**THEA 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

THEA 294. Individual Study. 1-5 Credits.**THEA 296. Field Experience. 1-15 Credits.****THEA 299. Special Topics. 1-5 Credits.****THEA 301. Musical Theatre Troupe. 1 Credit.**

A select performance ensemble of 10-20 students. Students will develop, do research on, and present songs and choreography from musical theatre productions. By audition and permission of instructor. May be repeated.

THEA 345. Devising. 3 Credits.

Development and application of skills required to create and perform innovative devised performances.

THEA 350. Theatre Foundations III. 1 Credit.

Seminar course for third year Theatre majors. Covers topics related to building the skills necessary to find work as a theatre professional. Meets once a week.

THEA 361. Acting III: Advanced Realism. 3 Credits.

Advanced studies in realistic acting technique and scene work. Course open to student with BFA-standing only. Prereq: THEA 261.

THEA 362. Dance Styles for Theatre. 2 Credits.

Intermediate study of the concepts and principles of ballet, tap and lyrical/jazz through studio practice and performance. May be repeated for credit. Restrictions: BFA MT permission of the Instructor or Head of the Dept.

THEA 363. Dance Studio II. 2 Credits.

Intermediate study in the study of the concepts and principles of ballet, modern, jazz, or tap dance through studio practice and performance. May be repeated for credit. Prereq: THEA 263.

THEA 364. Advanced Acting. 3 Credits.

Practical application of fundamental skills to textual work. Prereq: THEA 161.

THEA 365. Directing I. 3 Credits.

Introduction to the creative process of directing. Focus on script analysis, basic directing tools, and scene work. Prereq: THEA 161.

THEA 367. Acting the Song. 3 Credits.

Study and application of the integration of acting and singing techniques. This class will focus on developing the skills necessary for integrating acting methodologies with musical theatre songs and voice work. Students will explore emotional truth and embodied choices in combination with vocal dynamics to communicate effective storytelling. Prereq: MUSC 167 (1 semester), THEA 161 and students must be Theatre or Music majors only.

THEA 368. Business of Acting. 3 Credits.

Advanced study in business of acting, addressing resume/portfolio, photos, audition package/interviews, agents, unions, graduate programs, national theatre organizations, and audition resources. Prereq: BFA standing, THEA 261, THEA 266.

THEA 370. Technical Theatre Production. 1-3 Credits.

Advanced study in technical theatre production. Emphasis on planning and realization of technical theatre elements. Hours arranged as appropriate to assignment. Student should consult with instructor on number of credits to take. May be repeated for credit.

THEA 371. Introduction to Design: Scenic Design. 3 Credits.

This course introduces students to scenic design for the stage through play analysis, research, preliminary sketches, drafting, paint elevations and model building.

THEA 373. Lighting and Sound Design for the Theatre. 3 Credits.

An introduction to the art of theatrical lighting and sound design.

THEA 375. Costume Design for the Theatre. 3 Credits.

Introduction to the principles and practices of costume design for the theatre through script analysis, research, fabric selection, and sketching.

THEA 376. Theatrical Design Studio I: Theatrical Drawing and Rendering. 3 Credits.

Drawing and rendering techniques for theatrical designers.

THEA 377. Theatrical Design Studio II: Collaboration of the Designer. 3 Credits.

Development of collaboration, enhancement of design theory, and advanced practice of the design process.

THEA 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

THEA 381. Technical Theatre Seminar. 1 Credit.

A detailed study into the different technologies and processes involved in the technical areas of theatrical production. Each class will involve concentrated study in one category of technical production skills. May be repeated for credit.

THEA 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 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 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 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 100. You got here, now what? Tools for epic success. 1 Credit.

UNIV 100 is designed to help first-year students adjust to the university, develop a better understanding of the learning process, and acquire essential academic success skills. The course provides a general orientation to the functions and resources of NDSU. Attaining an appropriate balance between personal freedom and social responsibility underlies all University 100 activities.

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 131. Campus Fundamentals. 1 Credit.

This 16-week course will support students new to NDSU. This course will focus on campus supports, safety, and social involvement. After this course is complete, the intent is students feel connected and have a knowledge of where to go at NDSU when various supports are needed on campus.

UNIV 132. Social Navigation and Community Connections. 1 Credit.

This 16-week course will support the social navigation and community connections for college learners to thrive in a busy and changing world. Our body language and communication can change the intended meaning of our message. Helping learners work on self-awareness, communication strategies, understanding of emotions will provide a level of support as each person navigates their personal and social interactions.

UNIV 133. Self-Advocacy Skills and Executive Management. 1 Credit.

This 16-week course focus on improving executive functioning skills and building an organization system that can support each individual through their college and work careers. Time management, organizational skills, self-control, and determination will continually be practiced through the semester within this course.

UNIV 134. Financial Management. 1 Credit.

This 16-week course will increase individual understanding of personal finances and various banking options. Students will complete a mock budget, compare and contrast different account options, and learn about the similarities and differences within these accounts.

UNIV 135. Healthy Living and Human Sexuality. 1 Credit.

This 16-week course will support NDSU students in the are of healthy living and human sexuality. This course will look at various relationships through a healthy lens. This course will emphasis the understanding that relationships effect our whole-body health. Looking for signs that our relationships maybe unhealthy and learning and being informed about community supports will also be explored through this course.

UNIV 136. Work Place Communication and Social Navigation II. 1 Credit.

This 16-week course will focus on increasing interpersonal and communication skills within the workplace. During this course students will learn and practice skills related to interviewing and employment. Skills also practiced will include conflict/resolution skills, decision skills, and personal communication skills. By the end of this course, the goal is to gain confidence in knowing each individual's strengths and weaknesses to enter the workplace confidently.

UNIV 142. Resiliency: Pathways to Thriving. 1 Credit.

This course investigates research and practical activities that build individual strengths and foster social connections to empower stress management and increase resilience. Research, mindfulness, and focused writing are applied to increase awareness and practice skills of emotional responses to life's challenges, facilitate growth in response to adversity, and increase leadership capacity.

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 191. Seminar. 1-5 Credits.**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 440. Writing for Scholars, Fellows and Researchers. 1 Credit.**

Students will develop an understanding of the academic genre of grant and fellowship applications by analyzing a specific granting program, practicing the elements required for the application, and submitting a completed application. Pass/Fail only. Restrictions: Students must be planning to apply for the grant or fellowship identified in the course section in which they enroll. {Also offered for graduate credit - see UNIV 640}.

UNIV 489. Capstone Experience. 3 Credits.

Integrate coursework in student's area(s) of emphasis as stated in their proposal; explore options and apply strategies related to post-graduation career goals. F,S.

UNIV 491H. Seminar. 1-3 Credits.**UNIV 491. Seminar. 1-5 Credits.****UNIV 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

UNIV 494. Individual Study. 1-5 Credits.**UNIV 496. Field Experience. 1-15 Credits.****UNIV 499. Special Topics. 1-5 Credits.****UNIV 499H. Special Topics. 1-5 Credits.****UNIV 640. Writing for Scholars, Fellows and Researchers. 1 Credit.**

Students will develop an understanding of the academic genre of grant and fellowship applications by analyzing a specific granting program, practicing the elements required for the application, and submitting a completed application. Satisfactory/Unsatisfactory only. Restrictions: Students must be planning to apply for the grant or fellowship identified in the course section in which they enroll. {Also offered for undergraduate credit - see UNIV 440}.

UNIV 692. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

UNIV 695. Field Experience. 1-15 Credits.**UNIV 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 267L. Veterinary Nursing Lab II. 1 Credit.

Introduction and knowledge expansion of the hands on clinical procedures, instrumentation, animal behaviors, sample collection, necropsy techniques, and disinfection techniques used in the day-to-day operation of a veterinary facility. Prereq: VETS 265, VETS 265L. Co-req: VETS 267.

VETS 267. Veterinary Nursing II. 2 Credits.

Introduction and knowledge expansion of the clinical procedures, instrumentation, animal behaviors, sample collection, and disinfection techniques used in the day-to-day operation of a veterinary facility. Co-req: VETS 267L. Prereq: VETS 265, VETS 265L.

VETS 291. Seminar. 1-5 Credits.**VETS 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

VETS 294. Individual Study. 1-5 Credits.**VETS 296. Field Experience/Practicum. 1-15 Credits.****VETS 299. Special Topics. 1-5 Credits.****VETS 367L. Principles of Companion Animal Dentistry Lab. 1 Credit.**

Basic principles of veterinary dentistry lab. Including dental anatomy, physiology, pathophysiology, charting, and instrumentation. Techniques of routine dental prophylaxis, periodontal disease therapies, client education, and preventative oral care will be emphasized. Co-req: VETS 367.

VETS 367. Principles of Companion Animal Dentistry. 1 Credit.

Basic principles of veterinary dentistry. Including dental anatomy, physiology, pathophysiology, charting, and instrumentation. Techniques of routine dental prophylaxis, periodontal disease therapies, client education, and preventative oral care will be emphasized. Co-req: VETS 367L and must be a Veterinary Technology major. Prereq: VETS 267 and VETS 267L.

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, knowledgeably, 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.

WGS 796. Special Topics. 1-5 Credits.

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 (<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 Community and Belonging (<https://www.ndsu.edu/multicultural/>)
- Center for Writers (<https://www.ndsu.edu/cfwriters/>)
- Code of Student Conduct: Rights and Responsibilities of Community (<https://www.ndsu.edu/deanofstudents/accountability/conduct/>) (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/>)
- Metro College Alliance (<https://metrocollegealliance.com/>)
- Military and Veterans Certification (<https://www.ndsu.edu/veterans/>)
- One Stop (<https://www.ndsu.edu/onestop/>)
- Residence Life (<https://www.ndsu.edu/reslife/>)
- Student Engagement (<https://www.ndsu.edu/studentactivities/>)
- Student Health Service (<https://www.ndsu.edu/studenthealthservice/>)
- Student Success Programs (<https://www.ndsu.edu/studentsuccess/>)
- TRIO Programs (<https://www.ndsu.edu/trioss/>)
- Wallman Wellness Center (<https://www.ndsu.edu/wellness/>)

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- 2014-2015 (<https://catalog.ndsu.edu/past-bulletin-archive/2014-15/>)

Past catalogs are available and are archived offline in the Office of Registration and Records.

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